ARCHAEOLOGY AT HARATAONGA BAY, GREAT BARRIER ISLAND

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Abstract. The archaeological excavation of three small prehistoric Maori sites situated in a small bay on Great Barrier Island, New Zealand, is described, and the results of the analysis of the excavated material are presented. The sites comprise a beach midden dating from about the 13th century A.D., a second beach midden, and a fortified site, both of which are later in time. The data from the three sites when compared show changes in the frequency of use of fish, birds, mammals and shellfish, and changes in the individual species used in each group. Changes in the raw material used for tools also took place and the different character of the sites indicates changes in settlement pattern.

Great Barrier Island lies in the mouth of the Hauraki Gulf off the north east coast of the North Island of New Zealand. It is 20 miles (32 km) long, lying roughly north to south, a maximum of 12 miles (19.3 km) wide, and some 74,000 acres (299 km^2) in area. It is very rugged, rising to 2,038 ft (621.1m) at its highest point. Much of it is still forested. Considerable milling of kauri *(Agathis australis)* and other timber has taken place since European settlement but only a little of the island is under farm. These farms are at the heads of the harbours on the west coast and behind the bays on the east coast. Extensive areas of fire-induced vegetation also occur, some probably pre-European in origin like similar vegetation on other off-shore islands (Cochrane 1957, p.38). As a result of the limited pastoral development the population of indigenous birds is still substantial.

Geologically the island consists of a small area of undifferentiated greywacke in the north and around Harataonga Bay in the east with more recent volcanics elsewhere. The soils derived from these materials are fertile. Obsidian is associated with the acid volcanics, and, although no quarry sites have yet been found, this resource was almost certainly used by the prehistoric Maoris for flake material (Green 1964, p. 140; Green *et al.* 1967). Figure 1 shows the areas of acid volcanics on the island, both of which contain obsidian (Spring-Rice 1962; N.Z. Geological Survey 1960). Most of the flake-quality obsidian from the Ahumata source so far inspected is relatively clear smoky to grey colour in transmitted light. Some decidedly inferior green obsidian does occur in the Awana Stream source.

Natural food resources are abundant. The surrounding sea is regularly trawled and a whale fishery existed on the island irregularly in production till the 1950s. Sea birds are numerous (Bell & Brathwaite 1964) as are land birds. The east coast beaches, estuaries and rocky shores are ideal for shell fishing. The island was connected to the mainland during the last glaciation, so potentially all the flightless fauna of New Zealand should occur.

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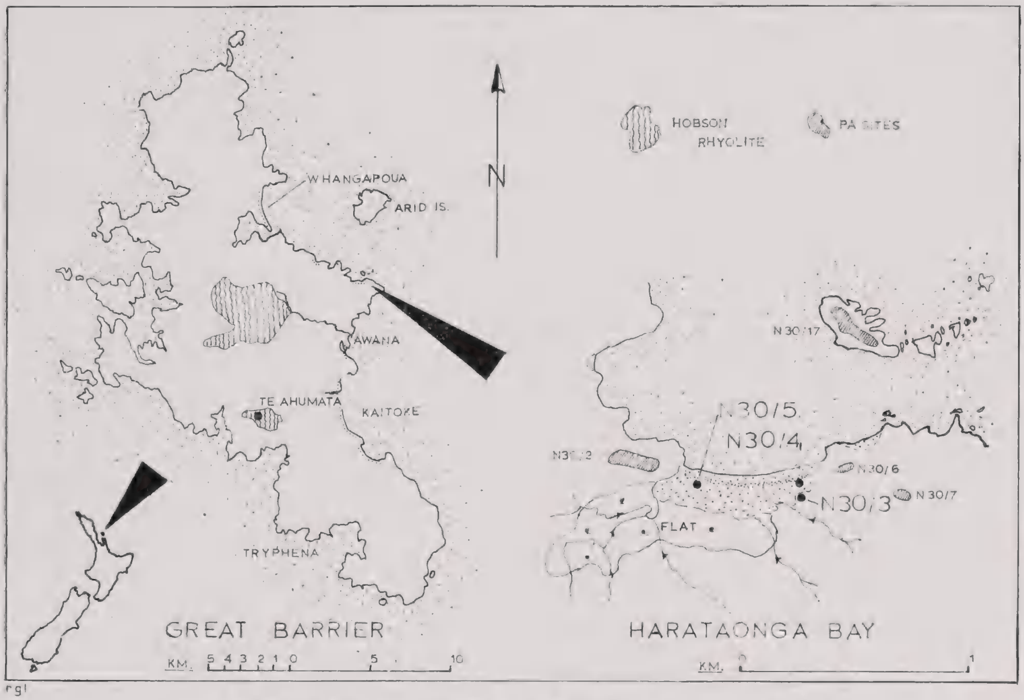


Fig. 1. Location maps, Harataonga Bay and the excavated sites.

Because of the difficulty of access little is known of the field archaeology of the island. Pa seem to be rare on the west coast, but quite numerous on the east coast, where beach middens sufficiently rich to attract fossickers also occur.

The sites described in this report were discovered by Mrs W. Spring-Rice (Spring-Rice 1962). Her survey covered the area around Harataonga Bay, a small sandy bay with a northerly aspect, fringed by rocky coast and sheltered by two small islands. As Fig. 1 shows, pa are a dominant feature of the bay, although some undefended pit sites occur on the ridges. Midden is virtually continuously exposed along a high sand ridge backing the beach. Behind the beach is a flat area of alluvial soil. Behind this again the hills begin.

The area was selected for further investigation for several reasons. The site survey had already revealed the existence of a very small defended site close to a midden suitable for the testing of various excavation and sampling techniques. The bay was within reasonable distance of the areas where obsidian reportedly occurred and these could be visited by small parties during the investigations. Finally the Royal New Zealand Naval Volunteer Reserve had generously offered to transport a field party to what was normally an inaccessible area.

At Easter 1962, accordingly, a party of 32 members of the Auckland University Archaeological Society was ferried to Harataonga Bay by an RNZNVR launch and commenced excavations under the direction of Dr R. C. Green and

Mrs W. Spring-Rice who made the field notes used in this report. The author was not present at the original excavations but has since had the opportunity to inspect the sites concerned in detail. Pressure of work had prevented the excavators from completing the analysis of the material recovered, and the invitation to the author in 1969 to complete the analysis and write the report is gratefully acknowledged. A preliminary report has appeared (Spring-Rice 1963).

As the excavations took place on three different sites which yielded very diverse results it is proposed to discuss each site separately, starting with the site which is apparently the oldest. The concluding section will attempt to correlate the three sites.

THE WESTERN MIDDEN N30/5

This site consisted of an eroding area of midden, the top of which was about 1 m above high tide level. The deposit formed a bank at the top of the beach and after a short length of exposure disappeared under the dunes behind the beach (Fig. 2). Excavation of this site was not part of the original field programme. Its potential was recognised by Messrs R. G. W. Jolly and R. Sunde who drew it to Dr Green's attention and a small excavation took place, to place on record another Archaic site, to test theories about the order

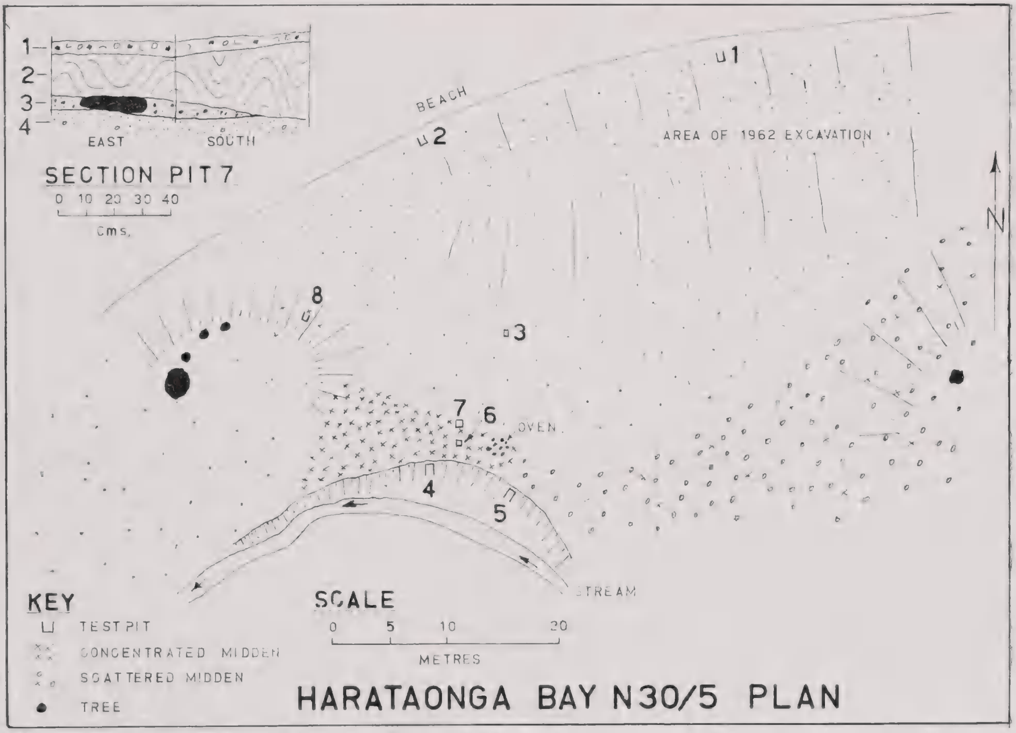


Fig. 2. Site plan N30/5, the western midden.

of exploitation of local obsidian resources, and to compare the economy with that excavated at another island site, on Motutapu Island (Pig Bay, N38/21) where despite an Archaic dating moa was unimportant.

A grid of three metre interval was aligned along the midden exposure and three 2.5 m squares were excavated within the grid in a line parallel with the beach. In addition, some material was recovered from the exposed seaward area of the site. With three sites being excavated concurrently in the bay, this site received less attention. However, the excavations recovered a wealth of material which makes worthwhile closer analysis of the data.

Part of the area excavated was stratified. An upper layer was recognised in squares B 1 (the eastern-most) and B 2. This, like the lower layer, consisted of diffuse midden. In square B 2 the upper layer included an oven and an adjacent lens of clay which must have been imported to the site. The upper layer was separated from the lower by up to 20 cm of clean sand. Material from these two squares, but not the baulk between was separated stratigraphically on excavation. In square B 3 the dividing layer was no longer present and only one layer was recognised. Lacking an internal division, it cannot be correlated precisely with either one or the other of the layers in the two adjacent squares. In consequence only part of the excavated material is stratigraphically divided.

In a brief visit to Harataonga in 1969, the author concentrated on this site. Figure 2 shows the general setting of the excavation to be reported in this section as it appeared in 1969. The area to the north of the small stream appears to be an extension of the area excavated. There has been considerable wind erosion here and midden material is exposed on the surface. This consists of an oven, a considerable quantity of small bird bone, a little moa in industrial waste, some shell and a considerable quantity of obsidian all of which was from Mayor Island. The obsidian seemed subjectively to consist of larger flakes than those from the excavation, several of the flakes being over 6 cm in length. A piece of the butt end of a reversed grip triangular sectioned adze was collected from this site. Several test pits were sunk but all except No. 7 showed only a thin surface layer resting on sterile sand. The section found in pit 7 is shown on Fig. 2. The stratigraphy was as follows:

Layer 1: Sand, grey with inclusions of shell, bone, pumice and obsidian.

Layer 2: Mottled, silt clayey light grey, and sand clayey grey-brown with inclusions of charcoal, shell, fishbone and siliceous flakes.

Layer 3: Flat rounded beach boulders in a matrix of grey-brown sand with an inclusion of a piece of the mineral asbeditis.

Layer 4: Brown sand, sterile except for several pieces of pumice.

The collection of pumice from layer 4 was identical to the pumice from the excavation but the surface material was sand-blasted, and probably from a source outside New Zealand (Wellman pers. comm. 1969).

This section and the rest of this area compare closely with the excavated area. With the importation of boulders and soil it appears some undefined construction has taken place on the site. In these circumstances the layer of sterile beach sand encountered in squares B 1 and B 2 of the excavation need not represent the passage of a significant interval of time between the deposition of the layers. None of the test pits elsewhere in the site suggests more than a single occupation. Moreover, where the excavated material can be divided into two stratigraphical groups, they show few differences. Data are available for bird, fish and mammal bone and for the artifacts. The small sample of shell was not suitable for subdivision. Both artifact assemblages are Archaic. The associated faunas are nearly identical. In view of the above, presentation of the data here is as for a provenly single period assemblage. This has the advantage of clarity and creates a larger pool of data for external comparison.

The provenances of the figured artifacts are noted in the figure captions. Unfigured artifacts include from the upper layer of squares B 1 and B 2, two roughouts, a fishhook core and a drill point, while from the lower layers are three fishhook pieces and two cores, a drill point, and two pierced *Glycymeris*.

The other stratified material from squares B 1 and B 2 is as detailed below with the upper layer first under each item. Mayor Island obsidian flakes, 18 (2.4 g average), 17 (3.3 g average), other obsidian flakes, 3, 2, Basalt and greywacke flakes, 105 (9.2 g average), 119 (5.2 g average), Siliceous flakes, 41 (5.9 g average), 12 (6.5 g average), Pumice pieces, 1, 21.

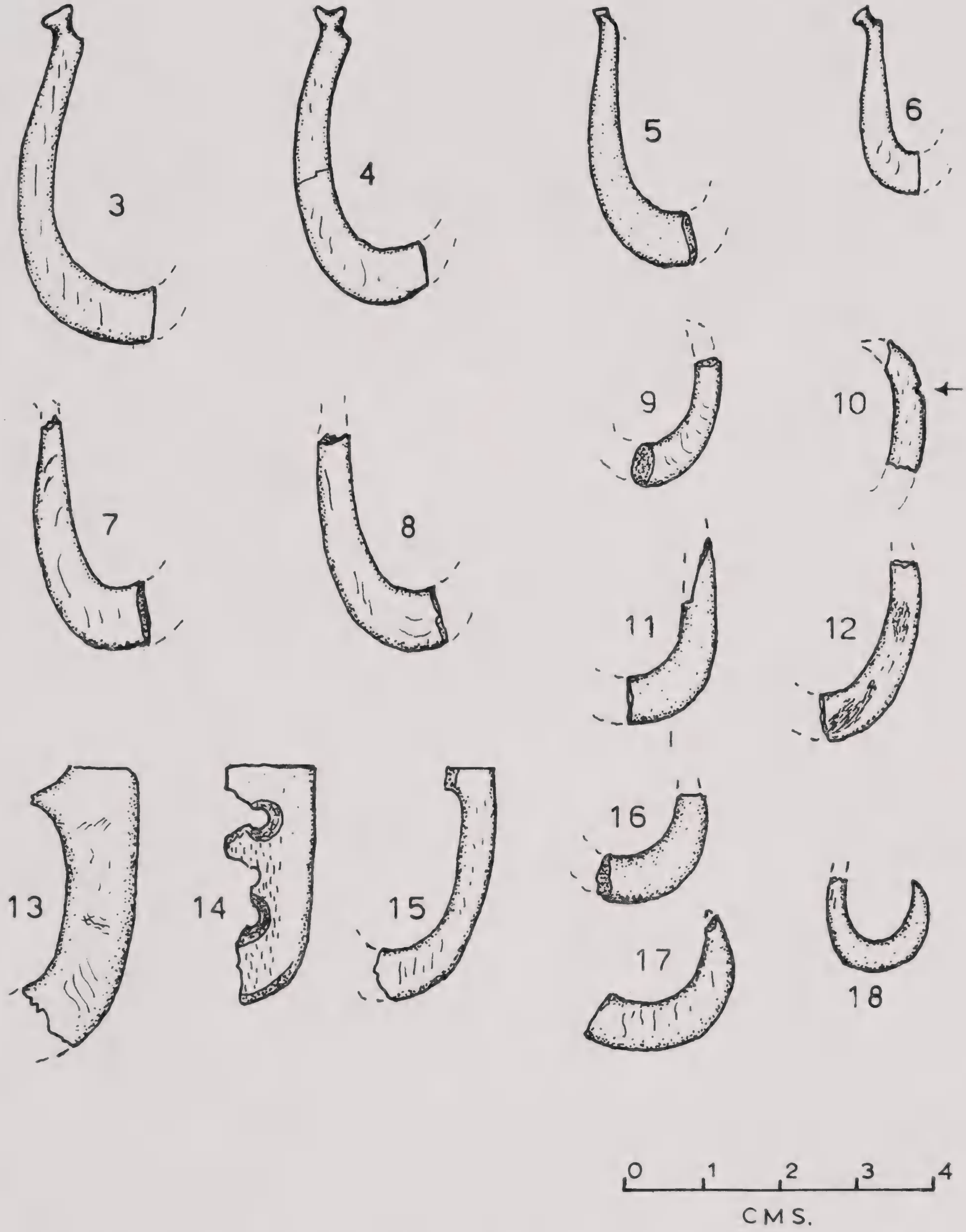
The only stratigraphic variations which may have significance are, the concentration of pumice in the lower layer, and the larger size of basalt and greywacke flakes in the upper. Data on the provenances of the faunal material has been included in tables.

ARTIFACTS

Fishhooks and lures

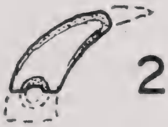
In all, 13 fragments of finished one-piece hooks were recovered (Figs. 3 - 18). The shank leg pieces, clearly the result of breakage in use, demonstrate the form of simple line attachment. The five fragments of unfinished hooks, of which three are illustrated, define the character of the other leg of the one-piece hooks. Only one complete point was found (Fig. 10) but this shows a characteristic bait notch on the outer edge. Two other pieces seem to be from hooks lacking an inturned point (Figs. 17, 18).

The first type of hook, one-piece with an incurved point, is in every respect identical to Crosby's Opito I variety (Crosby 1966, p. 187) which is characteristically found in large number in early sites in the north of the North Island (Nicholls 1964, p. 33 - 34; Golson 1959, p. 45; Roe 1969, p. 22). The second form with a shorter point leg, lacking the inturned point, conforms to Crosby's Opito II variety (Crosby 1966, p. 191) which is usually in association with the I variety. Crosby suggested this form is a broken and re-used Opito I hook. The material used for all these hooks but one appears to be moa bone, the remaining hook being apparently of ivory.



Figs. 3-18. Fishhook pieces from N30/5. 3, 11. Baulk B2-B3. 4, 5, 6. Surface. 7, 14. Square B1, upper layer. 8, 18. Square B2, upper layer. 9, 12, 15, 17. Square B1, lower layer. 10, 13, 16. Baulk B1-B2.

The lure shank (Fig. 19) is also of moa bone. The proximal end has a groove on the sides and the ventral surface forming the line attachment, while the distal end has a similar groove, and a point mounting facet on the ventral surface. There is a suggestion of lugs, as on bilateral shanks at Wairau (Duff 1956, p. 210), in the lateral bisection of the distal knob on the ventral surface by a notch. This shank is a fairly typical example of Crosby's Early Grooved Series of shanks. These are known widely in New Zealand although absent at Wairau. The form is most common in the Hauraki Gulf and Coromandel Peninsula (Crosby 1966, p. 101). Crosby regarded these shanks as an early adaptation to New Zealand conditions since several are known from other early sites. Two occurred at Pig Bay (N38/21) on Motutapu Island (Golson 1959, p. 46) and they also occurred in Ponui Midden (N43/1) (Nicholls 1964, p. 32). One was found in an early level of Kauri Point Pa (N53 - 4/5) (Green 1963, p. 70). This latter site association and their absence from early South Island sites, argues for regarding this type as intermediate, rather than simply early.



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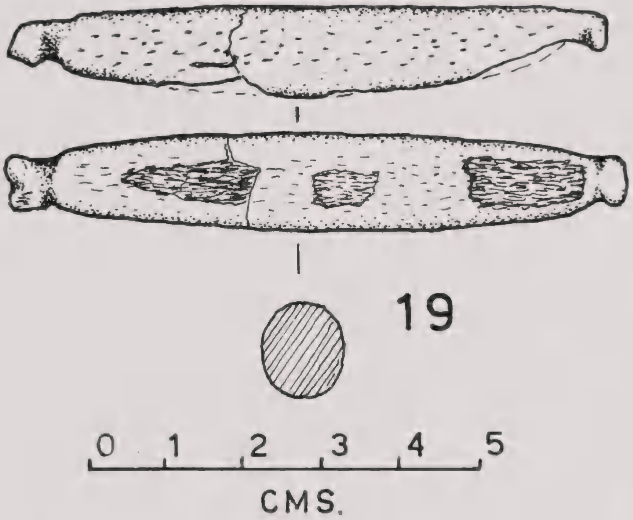

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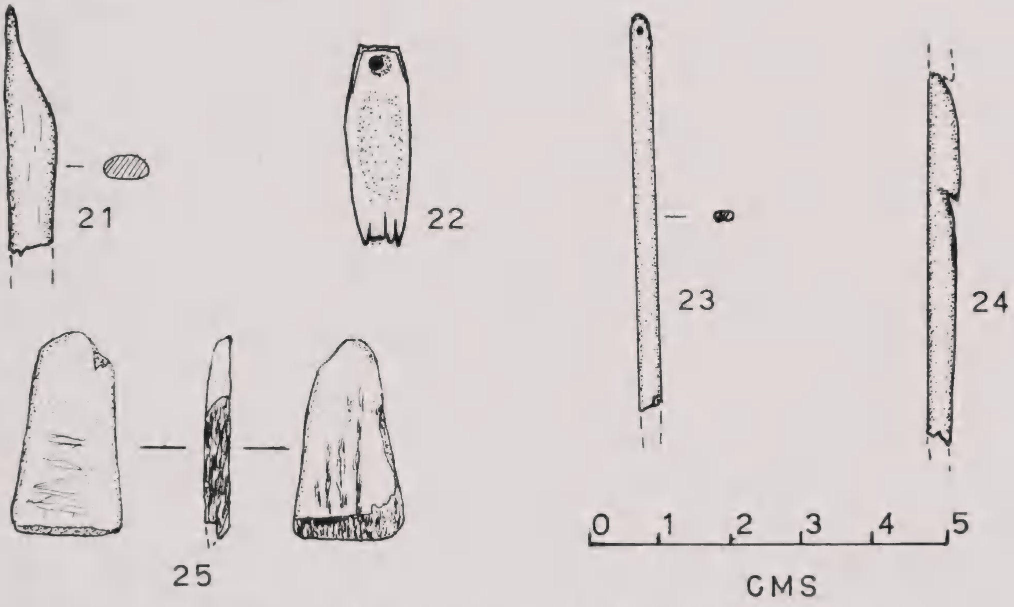
Figs. 19, 20. Lure fishhook and point, N30/5. 19. Surface. 20. Square B1, lower layer.

Although the shell lure point (Fig. 20) was not in association with the lure, the size of the mounting facet on the lure would not allow a point with a base length any larger than this. The use of shell for this point is unique, although the uniperforate form conforms to the usual pattern for the area (Crosby 1966, p. 148; Golson 1959, p. 45). Opito I variety hooks in shell are quite common and in view of the continued use of shell in the late lures, to claim a close relationship to tropical Polynesian lure points made of shell could be misleading. The increasing evidence that biperforate lure points, generally with a proximal extension, were the earliest type in tropical Eastern Polynesia (Suggs 1961, p. 83; Sinoto 1967, p. 358; Emory and Sinoto 1964, p. 149; Emory *et al.* 1959 p. 39) makes the almost complete lack of this form from the Coromandel area of New Zealand surprising, particularly since it is well represented in the South Island. It does, however, occur at Houhora (Roe 1969, p. 43).

The method of manufacture of the fishing gear shows clearly on several specimens. Apart from the evidence of unused tabs, most of the hooks show that they were worked from flat tabs by drilling out a core, the holes being advanced from each side of the tab. The hook was then filed to shape. The outside of the point was apparently the last part to be rounded off. The lure point perforation was also drilled from either side.

Other bone material

An awl and a very fine broken needle (Figs. 21, 23) give evidence that some fine sewing work was performed on the site. A small worked piece of bone (Fig. 25) could be a bone chisel although it is somewhat similar to bone tools which were found at Houhora and interpreted as skin burnishers used in preparing skins for clothing (Roe 1969, p. 69). The short perforated tattooing chisel (Fig. 22) can be matched with similar examples from early sites (Duff 1956, p. 223 - 224; Roe 1969, p. 77) and differs substantially from the later form from the Hauraki Plains swamp *pa* (Shawcross & Terrell 1966, p. 425). It is made from a thin section of bird long bone.



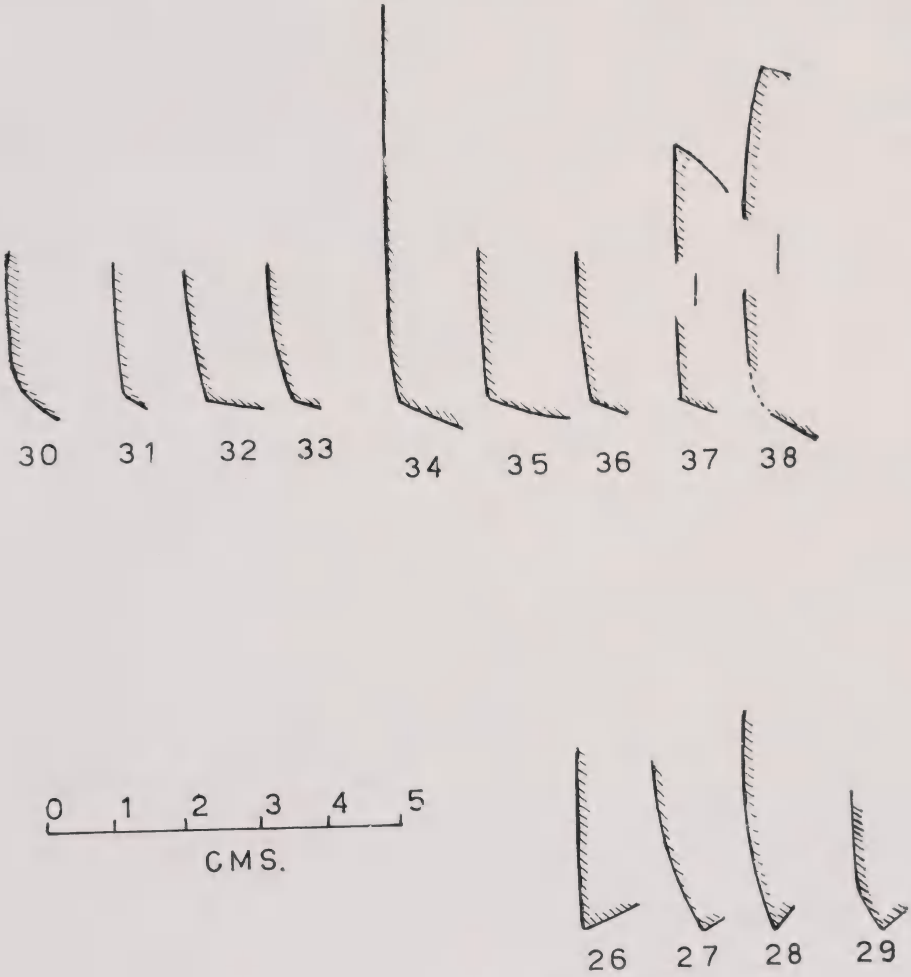
Figs. 21-25. Bone artifacts, N30/5. 21, 23, 24. Baulk B2-B3. 22. Surface. 23, 25. Square B2, upper layer.

The broken section of bird spear (Fig. 24) is a very important find. These spears are apparently a New Zealand innovation, none as yet having been found in tropical Polynesia and very few being known from early sites. This then provides important evidence that the Maori adaptation to New Zealand conditions was well under way when this site was occupied.

Besides the material mentioned above several amorphous worked pieces of bone occurred. These mostly showed signs of cutting or filing.

Adzes and adze flakes

Of 34 flakes from polished stone tools, 11 were polished on two surfaces suggesting they were from the edges of adzes. On four of these the surfaces meet at an acute angle (Figs. 26 - 28) but only one of these looks like a flake from the blade of an adze. All the other flakes appear to be from adzes which were being deliberately reworked. The remaining three flakes with acute angles are probably from triangular or trapezoidal sectioned adzes. The more obtuse angled of the flakes (e.g. Figs. 30, 31) may be from similarly sectioned adzes but the remainder are probably from rectangular sectioned adzes, some with convex sides.



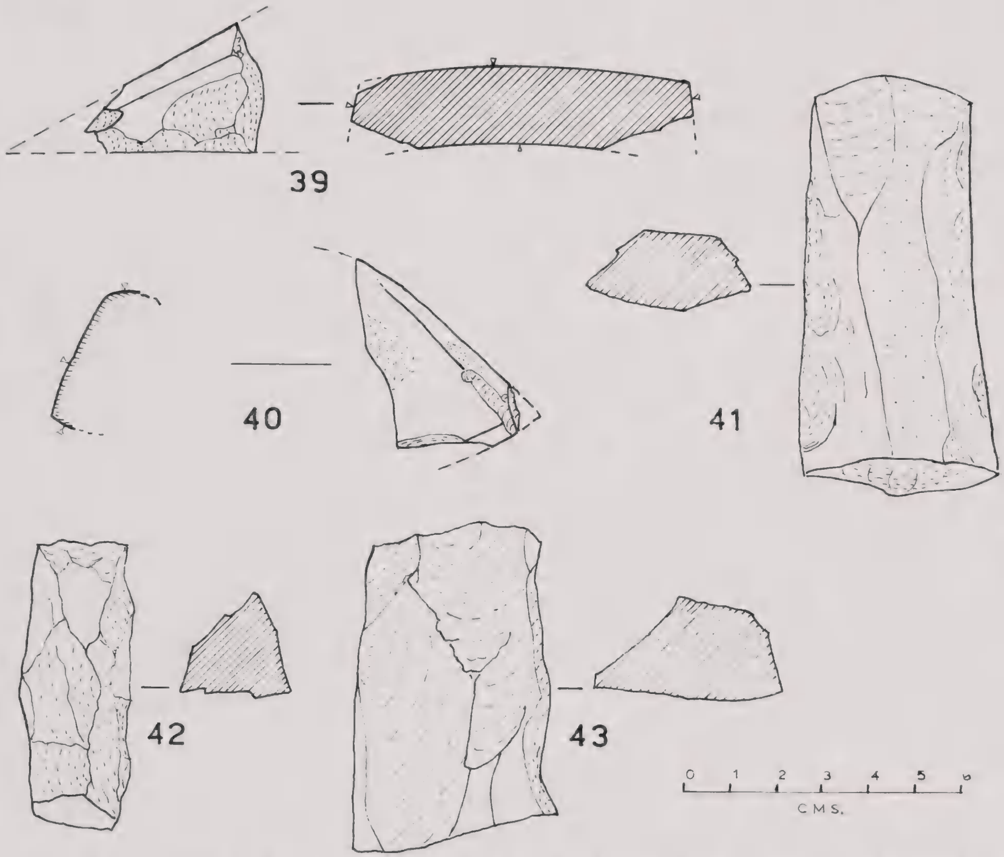
Figs. 26-38. Sections of flakes from polished tools. 26, 32 (part), 35. Square B3. 27. Square B1, upper layer. 28. Square B2, upper layer. 29, 38. Square B2, lower layer. 30, 31, 32 (part), 33. Baulk B2-B3. 34. Surface. 36, 37. Baulk B1-B2.

Two flakes showed three polished surfaces (Figs. 37, 38). The first of these came from the blade end of a rectangular sectioned adze as the edges defined by the surfaces met to form an acute angled corner of a right prism, such as is found at the blade. Two of the surfaces were perpendicular to the third. The extreme corner of the blade was missing.

On the second adze flake none of the three surfaces was perpendicular to another. Intersections of the three edges defined, when projected, were obtuse angled, and two acute angled. This flake was comparable with a section of one side of a deep triangular sectioned adze near the blade.

Although many of the flakes appeared to be from the same adzes only a few flakes could be fitted together. These, however, clearly showed successive flakes being removed from a platform at an edge of the adze. As well as polished flakes one flake from a hammer dressed surface was noticed.

Two substantial portions of finished adzes were found (Figs. 39, 40). Both had had flakes struck off them, one of which could be restored. One of the two is from the blade of a deep triangular sectioned adze, while the



Figs. 39-43. Broken adzes and roughouts N30/5. 39. Square B1, upper layer. 40, 42. Surface. 41. Square B1, lower layer. 43. Baulk B1-B2.

other is from the blade end of a rectangular sectioned adze with a hollow ground blade. In New Zealand the former are usually Duff (1956) type 4 A while the latter are usually Duff type 1 A. The Duff type 4 A is represented from surface collections elsewhere in Harataonga Bay. An unfinished Duff type 1 A from the bay is in a private collection. As it shows clear signs of reworking from a larger adze it is most likely to have come from this site.

A comparison of the materials of these flakes and adze pieces suggests that at least five different adzes were being reworked on this site. It is fairly certain that three different types of adzes occurred, deep triangular sectioned, rectangular sectioned, one at least with a hollow ground blade, and shallow triangular, or trapezoidal sectioned.

The rock types have not been closely studied but the most common is a basalt with dark phenocrysts. This material appears to differ from that from the quarry at Tryphena (Spring-Rice 1962, p. 94). The roughouts and flake material treated below are also of this material. Two other materials occurring in this assemblage of adze pieces are a dark grey-green metamorphosed mudstone and a light grey andesite (?).

The adze roughouts from the site are all small. Some have undoubted triangular sections while others have trapezoidal sections (Figs. 41 - 43). None had progressed to the hammer dressing or polishing stage before abandonment. All are apparently reworkings of large flakes. Almost all examples illustrate the deliberate striking of hinged flakes to reduce the angle of the striking platform nearer to a right angle. Possibly the trapezoidal sectioned adzes would become rectangular in section when they were finished.

Flakes

In comparison with the number of formal tools produced the quantity of flake material in the site is large. It consists of simple conchoidal flakes with no sign of retouch and little sign of use wear. Flakes of the basalt mentioned above are the most common. A few flakes of local water-worn greywacke boulders have been included in this assemblage of flakes. Flakes of a variety of siliceous materials are also common. Red jasper, brown chert, clear chalcedony and a range of less transluscent chalcendonies form the bulk of this material which was studied as a single collection of siliceous material. Obsidian was less common than siliceous materials and obsidian from the Mayor Island source was dominant. Only 5.9 % by weight and 10.5 % by number of flakes was non-Mayor Island obsidian.

Figure 44 shows the cumulative weight distribution curves of the four groups of flake materials. Clearly there is a wide range of flake size in all materials. Obsidian, possibly because of its brittle nature, has more small flakes, though many of the flakes weighing less than one gram are still usable as tools. The large proportion of the adze flakes in the smaller sizes may reflect close control of the re-working of adzes. In general, however, there is little to distinguish the four groups. On one site with many siliceous drill points the siliceous flakes are noticeably small (K. Fletcher pers. comm., site near Tauranga). No such case could be made here.

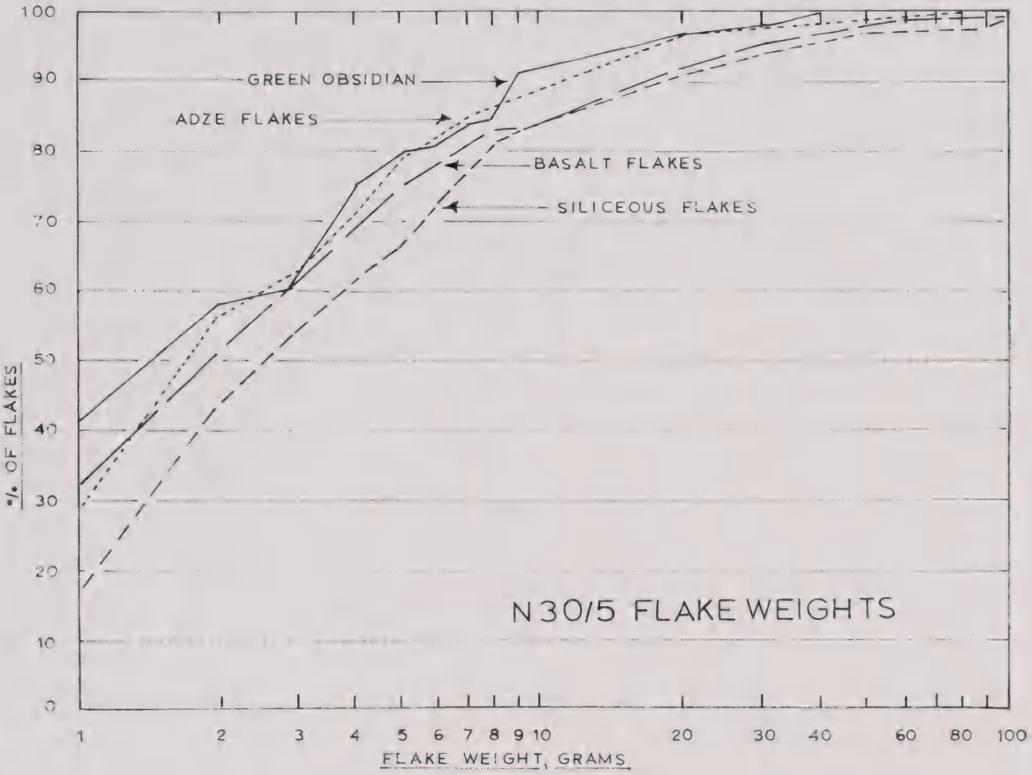


Fig. 44. Flake weight distribution curves for N30/5.

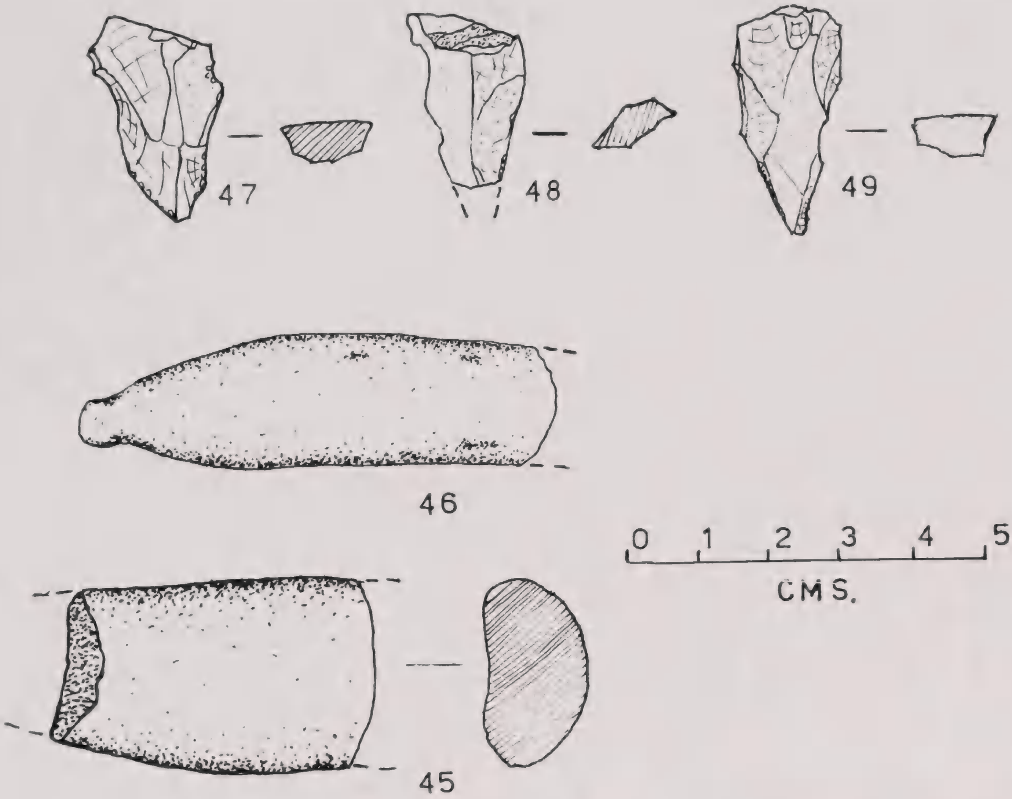
Green (1964) has put forward data showing early sites have higher proportions of Mayor Island obsidian than closer local obsidians, while later sites favour the closest source. The predominant use of Mayor Island obsidian here rather than the local material does suggest a relatively early stage in the exploitation of local materials.

Abraders

The edge of a flake of andesite shows wear consistent with its use as an attrition saw. Apart from this, only rhyolite has been used to make abraders. Most were apparently shaped first by flaking, as a number of otherwise unused pieces of this material were found. Another method of manufacture evinced from this bay has been described elsewhere (Law 1970). A few of the files had not been used after shaping while those which had were oval in section (Fig. 45). One showing unusual wear at one end (Fig. 46) had probably been used for shaping the inside curves of fishhooks.

Drill points

Six drill points were discovered, all worked from flakes of either brown chert or chalcedony (Figs. 47 - 49). Both the methods of manufacture described by Nicholls (1964, p. 30) were present, as well as two others. The two basic methods of working a flake to a point by flaking either edge from one face



Figs. 45-49. Files and drillpoints from N30/5. 45. Baulk B1-B2. 46, 47, 49. Baulk B2-B3. 48. Surface.

only or either edge from different faces, both occurred as at Ponui. A point worked on only one edge with a hinge forming the other was recognised while a fourth type with both edges flaked from both faces also occurred.

Miscellaneous

A core of andesite (?) showed signs of battering along its edges suggesting it had been used as a hammer stone. A small piece of the mineral asbeditis could only have been a curiosity to prehistoric men. Five shells of *Glycymeris laticostata* were encountered in the excavation. All were whole and four were pierced at the hinge (Fig. 50). This species lives only in deep water and could only be used for food after washing ashore in a storm, but no two of the five shells here form a pair. This shell is common on the beach today and it is noticeable that many are perforated at the hinge, apparently as a result of damage as they are washed ashore. The shells, then, were probably collected for some purpose. A collection was made of shells on the beach and from the whole of the midden area in the bay. This revealed that in contrast to the shells on the beach where only one third of the specimens were whole, the vast majority of the specimens from the middens were. Furthermore, of the whole shells, a far higher proportion of those on the midden were perforated at the hinge than

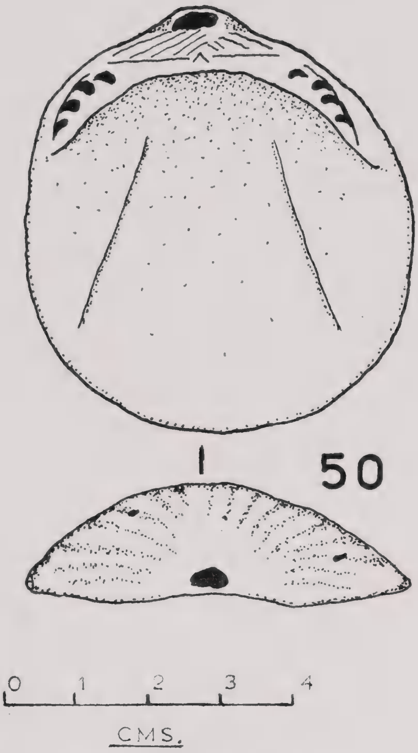


Fig. 50. Perforated *Glycymeris laticostata,* N30/5. Square B1, upper layer.

of those on the shore. This would suggest that the shells in the middens were selected for their completeness and their perforation. Possibly these were used as ready made necklace units.

Details of the artifactual material recovered are listed in Table 1.

Table 1. Artifactual material in N30/5.

	No.	Wgt. (g)
Worked Bone and Shell		
Broken fishhooks	13	
Broken unfinished fishhooks	5	
Lure shank	1	
Shell lure point	1	
Tabs	2	
Cores	4	
Needle	1	
Awl	1	
Tattooing chisel	1	
Broken bird spear	1	
Chisel (?)	1	
Worked fragments	5	
		48.9

Adze and Adze Flakes		
Polished flakes	34	179.3
Adze pieces	2	160.1
Roughouts	8	627.4
Flake Material		
Mayor Island obsidian	102	368.7
Other obsidian	12	23.0
Basalt flakes	228	1471.3
Siliceous flakes	223	1928.1
Abraders		
Files (some broken)	7	278.7
File blanks (some broken)	4	68.7
Cutter (attrition saw)	1	134.9
Flakes of rhyolite	36	259.4
Drill Points	6	24.8
Miscellaneous		
Hammer stone	1	284.2
Siliceous core	1	493.2
Perforated *Glycymeris laticostata*	4	51.5

FAUNAL REMAINS

While shell was not common in the site, fish, mammal and bird bone were. In the following sections shell identifications are by Miss J. M. Davidson, bird and mammal by Mr R. J. Scarlett and fish by Mr Brett Stephenson.

Shellfish

Although the midden was not concentrated a quantity of material sufficient for analysis was collected by sieving the material from all three squares. The species encountered are listed in Table 2.

Table 2. Shellfish in N30/5.

SPECIES	Wgt. (g)	% by weight
Lunella smaragda	263	21.4
Cookia sulcata	245	19.9
Nerita melanotragus	18	1.5
Haustrum haustorium	71	5.7
Neothais scalaris	84	6.8
Haliotis (?) iris	66	5.4
Mussel	73	5.9
Crassostrea glomerata	48	3.9
Amphidesma australe	30	2.5
Amphidesma subtriangulatum	5	0.4
Chione stutchburyi	48	3.8
Cellana radians	14	1.1
Cellana denticulata	64	5.1
Maoricrypta costata	4	0.3
Charonia capax	70	5.7
Mayena australasiae	66	5.4
Zediloma sp. *Melagraphia* sp.	5	0.4
Chiton	3	0.2
Modelia granosa	8	0.7
Austrofusus glans	2	0.2
Cantharidus opalus	2	0.2
Evechinus chloroticus	x	
Penion adustus	43	3.5
	1232	100.0
Not sorted	34	

The dominance of rocky shore species reflects the predominance of rocky shore environment near the site. All the usual food species from this environment are well represented but in addition there are a few shells of various species which have little economic use on account of their small size. Possibly they were collected merely as curiosities. Paua *(Haliotis)* and sea eggs *(Evechinus)* still attract the residents of the island to Harataonga Bay.

Of the species from other shores, only one, *Amphidesma subtriangulatum* is represented in a strand line collection from the shores of the bay. Pipi *(Amphidesma australe)* and cockle *(Chione stutchburyi)* are most unlikely to have grown in this bay, preferring much more sheltered conditions. They are almost certainly evidence of contact with an area where populations of these species occur. The closest such area today is six kilometres north-west along the coast. The moderate quantity of shell in relation to other faunal remains indicates shellfish did not play any large role in the inhabitants' diet.

Birds and mammals

In Table 3 an attempt has been made to give the minimum number of individuals which could be represented in the site on the basis of a count of repeated bones and immature bones. For the reasons given previously this has been done on a site rather than a stratigraphic basis.

Table 3. Mammals and birds in N30/5.

SPECIES	COMMON NAME	Minimum No.	Layer
Canis familiaris	Polynesian Dog	3 (1 immature)	b*
(?) *Arctocephalus forsteri*	Seal (?) Southern Fur	2 (1 male, 1 immature)	b
(?) *Euryapteryx geranoides*	Moa	1	u*
Diomedea sp.	Albatross, Royal or Wanderer	1	l*
Thalassarche (?) *cauta* subsp.	Mollymawk	1	u
Eudyptula minor subsp.	N.I. Little Blue Penguin	4	b
Pterodroma macroptera gouldi	Grey-faced petrel	5	b
Puffinus gavia gavia	Fluttering Shearwater	2	b
(?) *Pachyptila turtur*	Prion (small) (?) Fairy	1	[1]—
Larus sp.	Gull red or black-billed	1	—
Phalacrocorax (?) (Stictocarbo punctatus punctatus)	Shag (?) spotted	2	u
Phalacrocorax carbo novaehollandiae	Black shag	1 (nearly complete)	—
Phalacrocorax (?) *melanoleucos brevirostris*	Shag (?) white-throated	1	u
Phalacrocorax sp.	Shag, smaller than spotted, larger than black	1	—
Anas (?) *castanea chlorotis*	Teal (?) brown	1	l
Nestor meridionalis septentrionalis	N.I. Kaka	3	b
Prosthemadera novaeseelandiae novaeseelandiae	Tui	1	u
Hemiphaga novaeseelandiae novaeseelandiae	N.Z. Pigeon	1	l

* Squares B1, B2. u — upper layer, l — lower layer, b — both. [1]—, Square 3 and baulks.

The low number of immature bird bones in the material from the whole bay was deemed worthy of note (R. J. Scarlett pers. comm. to R. C. Green) and this site is no exception. The moa consisted entirely of industrial fragments but green breaks were definitely present.

A good deal of information is available on the bird population of Great Barrier and neighbouring Arid Island (Bell & Brathwaite 1964). Other islands off the north-east coast of the North Island also have rich avifauna when compared with the mainland. Three areas are bird sanctuaries, Little Barrier, the Poor Knights and the Hen and Chickens, while another group, the Mercury Islands, has a large bird population because of some intact vegetation. Again considerable information is available (Skegg 1962, p. 153; 1964, p. 159; Turbott 1961, p. 140).

Moa is of course extinct, but virtually all the other birds listed in Table 3 still occur in this locality. Mollymawk and albatross are known only at sea. Of all the other birds only spotted and white-throated shags and fairy prion do not now nest on Great Barrier although they nest on other off-shore islands. Brown teal was near extinction on the island at European contact but Great Barrier is now its only stronghold. Maori depredations may well have been responsible for the previous reduction.

Burrow-nesting birds are well represented in the site and the method of taking these in the burrow is well known. The taking of albatross is more difficult, but it may be possible from canoes when the birds are gorged, or in still conditions when they cannot get airborne. Little is known of shag taking, but in Patagonia they were taken in their rookeries at night either by stealth or by disorienting them with flares and collecting them as they tried to fly away (Bridges 1948, p. 98). Kaka, tui, and pigeon were undoubtedly speared very easily. The presence of these birds as well as the bird spear is instructive. Water troughs to take pigeons and decoy birds to take kaka were fairly important parts of Maori fowling equipment for at least part of the year. With spears as an early cultural item the additional presence of these two items would not be too surprising.

The presence of seal and dog as major items of diet is an important trait. Seal and dog appear to be more common in early middens than late (Green 1963, pp. 52, 56). Seals are now rare visitors to this coast. While European depredation of seal populations must influence the modern situation it can be inferred that their numbers were greater in relation to human population early in the local prehistory. The economic position of dogs in New Zealand prehistory has been fully discussed by Allo (1970, 1971).

The needle and awl could well have been for sewing dog, seal and moa skins.

Fish

The fish remains proved to be very fragmentary. Despite this, careful study enabled 43 % of the fragments to be identified. The species are given in Table 4.

Table 4. Fish in N30/5.

SPECIES	COMMON NAME	No. identified pieces	Layer
Chrysophrys auratus	Snapper	321	b*
Polyprion oxygeneios	Hapuka	5	b
Navodon scaber	Leather jacket	10	b
Coridodax pullus	Butterfish	5	l*
Allomycterus jaculiferus	Porcupine fish	1	[1]—
Verreo oxycephalus (probable)	Parrot fish	1	u*

* Squares B1, B2. u — upper layer, l — lower layer, b — both. [1]—, Square B3 and baulks

Because the material was so fragmentary no individual counts were possible. Leather jacket was identified almost exclusively by its distinctive spine giving eight as its minimum number. The dominance in the table of snapper can only represent a dominance of snapper in the fish caught. Some of the snapper is very large. The presence of snapper and hapuka is consistent with line fishing with baited hooks, and this style of fishing is well indicated by the artifacts. Interestingly, at an earlier excavation on the Coromandel Peninsula, a broken point of an Opito I fishhook was found between the jaws of a snapper. In the dominance of snapper this site compares closely with the lower layer at Tairua (N44/2) (Smart & Green 1962, p. 262); and with Hot Water Beach (N44/69) and Houhora. If any economic activity characterises the early settlement in the north of the North Island it is intensive line fishing for snapper. Certainly moa hunting must come a long way behind.

Leather jackets and butterfish are both found in rocky shallow water and both have small mouths, probably too small to take any bone hooks. Witter (1969, p. 51) showed that leather jackets are common in middens in this area. He considered they were caught by trapping. Netting with hand held baited nets is a possibility he did not consider. This method has been recorded for New Zealand (Banks 1963, p. 456). Whatever method was used it is certain that some other method of fishing beyond line fishing and trolling was known. Witter to the contrary, leather jackets are good eating. Porcupine fish flesh however is poisonous and this fish could only have been brought in with the catch as a curiosity.

Despite the presence of a lure no species of fish normally taken while trolling appears in the site. Unfortunately there are no data available from other sites to confirm if this is typical, but if it is, the variety of lures found in this area is all the more remarkable.

General

The wide variety of the faunal remains is worthy of note. There are 21 species of shellfish, 18 identified species of birds and mammals, one further unidentified bird and six species of fish. The varied environments from which these came and the differences of these environments from those in any tropical homeland argue that the former inhabitants of this site had dwelt in this part of New Zealand long enough to know it well.

While the range of environmental sources represented by the faunal remains at a site are capable of being identified, the exploitation of these environments as a set of economic activities is more difficult to reconstruct. For instance, there are several ways bone material can arrive in a site. Waste products from fish, lizards, rats, dogs, birds and sea mammals procured for food are the obvious source for the majority of the items, especially if it is assumed that the materials on a site reflect to any degree the economic activities of the group. However, procurement for food does not necessarily always imply consumption, as parts of some items could be preserved or simply wasted. Conversely, consumption of a preserved bird or fish at a site need not imply that it was present in the immediate locality during the season of occupation. Apart from food, live or recently deceased birds may be procured solely for their feathers or useful bone. Similarly, useful bone could be collected without consumption of the flesh from recently deceased mammals such as dogs and seals, or from semi-fossil deposits of bone or even from older middens. As well, the risk is always present of dogs, rats and possibly some birds expiring on the site without being eaten. Thus it would almost certainly be wrong, for example, to assume that moa, or the almost complete shag, or the *Glycymeris laticostata* shellfish were consumed on this site.

Finally there is the difficult question of dogs. Dogs may well have had to forage for themselves, consuming what was left on the midden heaps and supplementing it with their own hunting. Indeed unless there is evidence to the contrary, this is to be expected. Thus when dogs were present in any numbers they would almost certainly be responsible for the removal of bone including fish from a midden, and possibly also for the introduction to the site of bird bone, or the bones from decomposing remnants of sea mammals. Rats might also be involved in the removal of bone. In view of the presence of dogs, and bones gnawed by rats on this site, it can be assumed that these animals in fact have disturbed it, although no rat bones were found.

There is also the possibility that some bone material has been removed by human activity, either in the process of manufacture of tools, or by preservation of some items for consumption elsewhere. The first activity would certainly seem to be a factor at this site, while there is the possibility that preservation was also carried out, particularly of petrels and fish.

Clearly then, a diet as attested by the bone composition of a midden may differ considerably from the actual diet of the site's occupants as a result of the above factors. Any conclusions on environmental determination or cultural preference should be tempered by this possibility. Additional biases are possible from excavating small parts of sites or sites which have accumulated in a very short time. Continuing in this vein it is possible by inventing new degrees of freedom to demolish economic archaeology almost completely. Suffice it to say that any reconstruction can only be as complex as the evidence will allow, and not as complex as is theoretically possible.

DATING

As part of his investigation of obsidian in New Zealand, Green measured a hydration rim on one flake from this site. A freshly exposed surface of this natural glass develops a thin surface layer of hydrated material called a rim. This rim thickens at a rate dependent on temperature. Comparison of rim thicknesses on obsidian from a number of sites enables a relative chronology to be established.

The flake measured was of Mayor Island obsidian from the lower layer of square B2 (A.U. register No. 777/2). Five measurements were made at different points and gave readings of 1.3750, 1.6500, 1.7200, 1.5125 and 1.6500 microns respectively. Comparison with other sites (Green 1964, p. 135) indicated that this flake is younger than the pre-Rangitoto ash occupation at the Sunde site (N 38/24), contemporary with layer 2 at Tairua (N 44/2) and older than any material at Opito Beach midden (N 40/3). The first site is earlier than the Rangitoto ash which is now best carbon dated as 14th century (Golson & Brothers 1959, p. 569; J. M. Davidson pers. comm.), but as the occupation may be considerably earlier than the ash this date does not limit the occupation at Harataonga Bay. Tairua has two radiocarbon dates from the same oven of A.D. 1072 ± 49 and A.D. 1507 ± 40, the latter of which Green rejected as probably contaminated in the interval between collection of the two samples. Although this is justified on cultural grounds (Green 1967, p. 83, Smart & Green 1962, p. 249), it is a massive contamination. The Opito site has a date of A.D. 1310 ± 50 and this seems correct in relation to other sites in the area of Opito.

As mentioned above a considerable amount of pumice was found in the site, the stratified material being predominantly in the lower layer. This pumice was fine in texture, hard, dark in colour with occasional banding and inclusions of dark minerals, conforming in every way to Wellman's (1962 p. 78-80) description of Loisels. This was confirmed by sending a sample to Professor Wellman (pers. comm.). Consideration of radiocarbon dates places this pumice at about the 13th century. Its position in the site suggests that occupation took place on a lag layer of this pumice and thus is in or post-dates the 13th century.

However the Opito site (N40/3) has Loisels pumice stratigraphically above the layer carbon dated. By pumice stratigraphy N 30/5 should be younger than Opito but by obsidian fringes it should be older. Either of these inferences could be at fault, for in the first case the Opito pumice need not be a primary deposit, and in the second the work on obsidian fringes is only in a preliminary stage.

Thirteenth and 14th century carbon dates need very little correction and retain unimodal frequency distribution when reflected through the Bristlecone pine correction curve. However the early Tairua date becomes bimodal with peaks about 1060 and 1210 AD. Clearly N 30/5 will not be closely dated until more progress is made on the chronological problems of northern New Zealand. A 13th century date does seem the most likely.

BURIAL

In test pit 8 a burial which was on the point of eroding out of the dune was excavated. This proved to be a burial of a child in a crouch position facing out to sea. The arms were folded across the chest and the knees drawn up to the chin. The lower legs were crossed and in the limited excavation there were no grave goods. There was no observable burial pit in the clean dune sand. The immature state of the bones made a sex determination difficult. Only one of the usual characteristics gave a positive answer and reliance on only one is dangerous. This was the sciatic notch which was acute, suggesting a male.

The full deciduous dentition had erupted and the second molars of the permanent teeth were formed but had not erupted. This would suggest an age between four and six years. However the skull and teeth had some unusual features. The bite was edge to edge and all the teeth were faceted by heavy grinding wear. This is remarkable in milk dentition. As well as this the sagittal suture of the skull had largely closed and there was a remarkable constriction behind the frontal bone. These features suggest the individual had some congenital abnormality and this in turn could explain the heavy grinding wear, as deciduous dentition is often retained for longer in such individuals.

The lower jaw was broken on the right side and a tooth was missing from the upper jaw in a parallel position which suggests violent death. On the eroding surface of the dune spilling down the slope from above the burial there was a small assemblage of obsidian flakes and one core, on to which some of the flakes could be fitted. Mayor Island obsidian was in a minority. This could be an assemblage of scarification tools but it is impossible to place the flakes as contemporary with, earlier or later than the burial on purely stratigraphic grounds. This burial can almost certainly be related to burials found previously at this end of the beach, some of which had greenstone ornaments associated (H. G. Overton pers. comm. to W. Spring-Rice).

The proximity of this burial to N 30/5 is interesting but not conclusive. Crouch burials are certainly an early form (Emory and Sinoto 1964, p. 148) and the trussed burials at Wairau Bar are not dissimilar (Duff 1956, p. 47-48). Proximity of burials to living sites is not unexpected in early phases of New Zealand prehistory but the presence of greenstone in some burials and the continued use of crouch burials in late times make a late date in this case rather more attractive.

SEASONALITY

A good many of the animals present in this site have some seasonal restriction to their taking or other characteristics which can be used to demonstrate when the site was occupied. All of this seasonally restricted material seems to occur in both layers of the site.

The fur seal is in recent times an infrequent visitor to this coast. A well attested pattern of behaviour of this seal is for some of the males accompanied by a few cubs to move north for the winter returning to the southern breeding grounds after October. A few do however stay on through the summer, at least at Kaikoura (Stonehouse 1969, p. 520). It would appear that in early prehistoric times this pattern extended to the north of the North Island. The presence in this site of male and immature specimens is strong evidence in support of this pattern. It would appear likely on this evidence that the site was occupied for at least part of the winter until October or thereabouts.

Burrow-nesting birds are generally species which spend little time ashore, other than to nest, thus they are almost certainly taken from their burrows in the nesting season. Seasonal data on these birds, from a wide variety of sources, is summarised in Table 5.

Table 5. Seasonal occupation of nesting burrows.

COMMON NAME	USE OF BURROW ADULTS	NESTLING
N.I. Little Blue Penguin	Aug. - Dec.	Oct. - Dec.
Diving Petrel*	April - Dec.	Sept. - Dec.
Fluttering Shearwater	Sept. - Mar.	Nov. - Mar.
Fairy Prion	Oct. - Feb.	Dec. - Feb.
Grey-faced Petrel	All year	Aug. - Jan.

* Bird found in eastern midden

The penguins spend most of the remainder of the year at sea but they do come ashore in storms. All the petrels except grey-faced tend to become less common out of the breeding season, and the majority move well off shore.

In the northern North Island the grey-faced petrel replaces the sooty shearwater as the traditional mutton bird. They are still taken on Red Mercury Island, Mokohinau Island and White Island in large numbers. The immature birds are taken in the month of November. In recent times, despite the large numbers taken (3000 on White Island), no preservation is carried out as in the south (Gillham 1965, p. 225). The author is aware of no records of such preservation ever being carried out in the north.

Other birds are not definitely seasonal. Despite the well known seasonal methods of taking pigeon, kaka and tui, their taking in other seasons is far from impossible, and continuous exploitation, particularly of kaka, must have been possible.

The evidence of the birds is not very definitive. A short occupancy during or within the months of October to December would be sufficient to explain the evidence. This does not rule out continuous occupation, of course, and an occupation which ended in August/September and began again in January or February could still accommodate the evidence of the birds. It is surprising that of the minimum number of 12 petrels and penguins represented none are immature. This would suggest that the occupation or at least the birding took place early rather than late in summer, but as this is negative evidence, it should be used with caution.

In the south of the South Island of New Zealand several species of shellfish have been observed to lay down annual growth rings and possible daily growth rings have been observed in *Chione* (Coutts 1970). These give promise of very close seasonal control of sites. The shellfish from Harataonga Bay do not show any clear annual growth ring so this technique could not be applied here.

Of the fish represented only two are in any way seasonal. Snapper are more common in late summer and autumn (Shawcross 1967, p. 116-118) but it is not impossible to take them over the whole year. Hapuka move to deep water in the winter and can only be caught on very long lines. Spring to autumn is therefore more likely.

A difficulty of any investigation of seasonality is that no one site can clearly demonstrate when it was not occupied. At a site where fish drying or bird preservation evidence might be found in the form of incomplete skeletons, it is a reasonable assumption that a parallel site must have existed. However where this evidence is lacking there are always the possibilities that the site was occupied but the inhabitants were at times eating food which left no remains or subsisting largely on that which was available in all seasons. Only the finding of a parallel site which provides evidence for the remainder of the year can remove this doubt.

At this site we have evidence of occupation in the spring at least. The bird bone showed no clear evidence of bird preservation, and the fish bone was too fragmentary to demonstrate fish drying. It must then remain a possibility that the site was continuously occupied for a period measuring up to several years, though in this case the number of people involved must have been small.

If the site was continuously occupied the obsidian and sheltered shore shellfish must have been acquired by periodic external visits either to or from the bay, rather than a single initial supply being brought in, which would be more likely in the case of a group occupying the site only temporarily. The two layers in the site could well have been formed during a short visit. There is no evidence for a decline in the available raw materials in the upper layer, which would rule out any single seasonal occupation which only used raw materials brought at the beginning.

Two successive seasonal occupation forming the separate layers could explain this difficulty.

DISCUSSION

The earliest period of North Island prehistory might be more fairly described as arcane than archaic. Of the major artifact-producing sites of Opito (N40/3), Sarah's Gully (N40/9), Pig Bay (N38/21) and Houhora, only the latter has a report available (Roe 1969). This, an unpublished thesis, describes the artifacts but not the economy or the structure in the site. Virtually all the other early sites for which reports exist, such as Tairua (N44/2) and Ponui (N43/1), contained so little in the way of artifactual material that it is only possible to refer them to Golson's Archaic phase or Duff's Moa-Hunter Period and make no further elaborations to the sequence by setting up each site as an individual component.

To the extent that it is not published and therefore not completed the first problem Golson set out to solve remains unsolved. This was discovery and definition of the earliest period of prehistoric occupation in the North Island. To only a small extent can this site correct this situation.

Green initially placed N30/5 in either his Settlement Phase or early Developmental Phase (Green 1963, p. 46) but with this analysis completed there are good grounds for removing it from the Settlement Phase. In the first place the initial settlement of this part of New Zealand was probably some time earlier than the dating of this site. Cultural material certainly underlies Loisels pumice elsewhere in the North Island (Wellman 1962, p. 88). This would bear out Groube's contention (1968, p. 145) that the earliest sites in this area of New Zealand are still unexcavated.

There are several other grounds. The range of species exploited and the variety of raw materials used suggests that the inhabitants of this site knew well the area in which they were living and had adapted their gathering techniques to this environment. The tool kit, while still of early types, shows at least one item, the bird spear, hinting towards later adaptations of Maori culture. The lure shank might be similarly interpreted.

The presence of no more than one species of moa and the lack of a single other extinct bird, such as are not uncommon in basal layers of other Archaic middens, are negative evidence suggesting the site is not very early in the sequence. Green's sequence of phases is now rather dated although it is still a useful framework. In the lack of better, this site could be placed in a Developmental Phase.

The range of material from N30/5 can only lead to the conclusion that it was a generalised occupation site, where many different activities were carried out. While no evidence of structures was encountered in the excavation the slabs of rock found in test pit 7 might suggest that some structures existed elsewhere on the site.

Following Green's criteria, if the site belongs to the Developmental Phase, its inhabitants should have lived in semi permanent settlements but with some site specialisation beginning to appear (Green 1963, p. 101). Green's conclusions on the nature of settlement were widely criticised and as yet little unequivocal evidence has been published to demonstrate the permanence or otherwise of the early settlement.

It is questionable whether it is more dangerous to assume that movement was common or uncommon. To prove movement from archaeological evidence, permanent settlement should be assumed and the evidence made to prove otherwise. However, ethnographic analogy suggests that groups practising exploitational economics regularly move, so to insist on lack of movement until proved otherwise may be dogmatic. If the site is seen as a near contemporary of Sarah's Gully settlement (N40/9), Skipper's Ridge (N40/7) or the Moturua Garden, Green's conclusion on site specialisation is tenable as a tendency towards specialised storage components must be occurring. But site specialisation need not imply seasonal or irregular movements over more than a few hundred yards or on a daily basis. The early settlement pattern for northern New Zealand must remain an open question.

THE EASTERN MIDDEN N30/4

At the eastern end of the bay lies the second site excavated (Fig. 1). It is situated on a low natural terrace immediately behind the beach (Fig. 51). Before excavation commenced the terrace was not grassed and the midden material showed on the surface.

Eight and a half 2 m squares were excavated and several of the 1 m baulks between the squares. The original purpose in excavating this site was to test sampling and analysis techniques for diffuse middens that Miss J. M. Davidson was studying as part of her M.A. research at Auckland University. As she outlined in her thesis (Davidson 1964, p. 130), this was not entirely successful owing to a misunderstanding on the part of some of the excavators, but six squares were

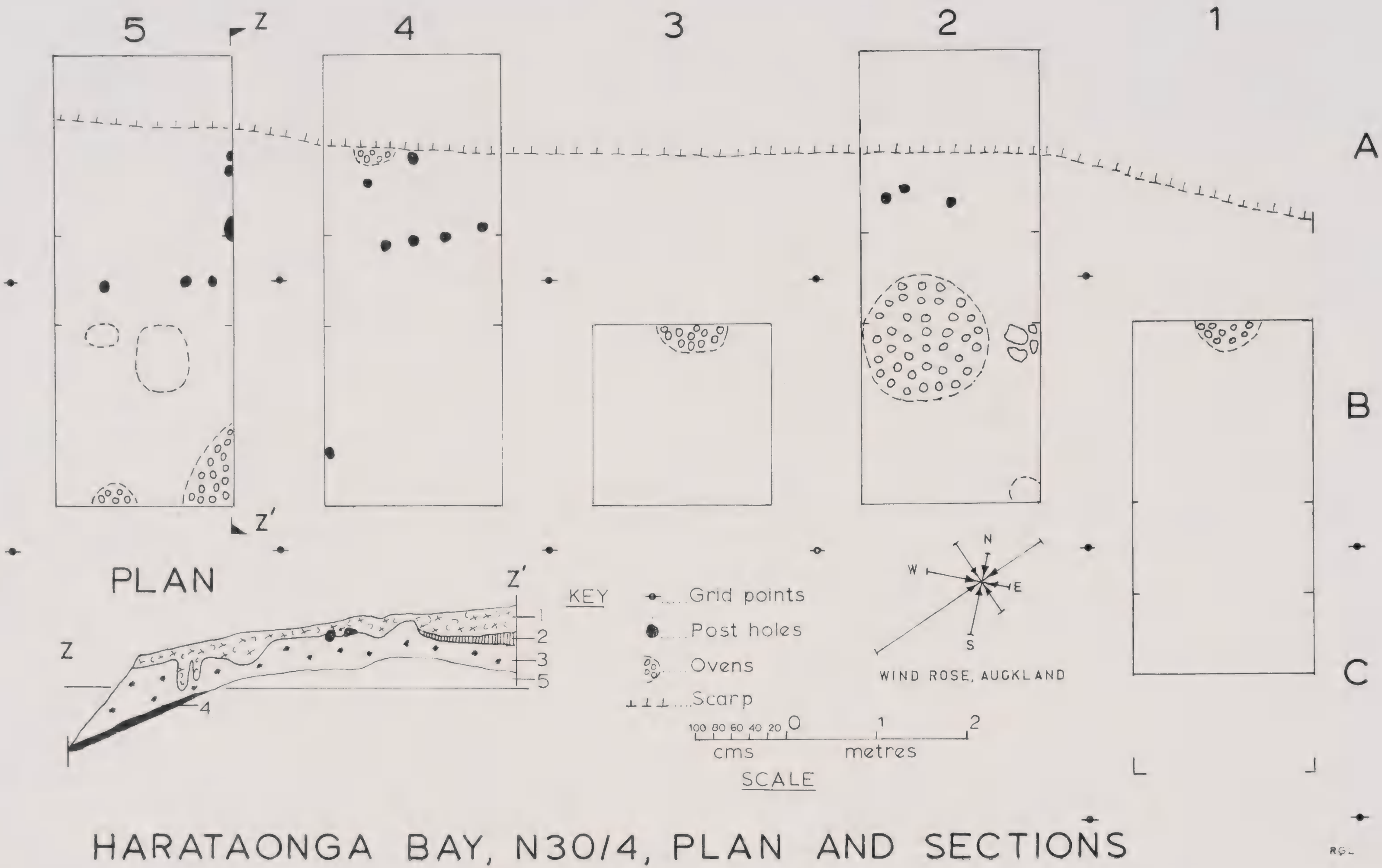


Fig. 51. Site plan N30/4, the eastern midden.

sampled by retaining all shell and bone material which did not pass a ¼ inch sieve (6.3 mm). It was originally intended to quantify the oven stone and charcoal in the site, and to take comparative samples with ⅛ inch sieves but this aim was not realised. Over 40% of the extent of the midden was sampled. Given the complete state of most of the shell, a ¼ inch sieve can be expected to yield reliable samples.

STRATIGRAPHY

The stratigraphy proved to be simple. The surface midden layer, layer 1 was fairly homogeneous, consisting of dark grey sand, with inclusions of rock, charcoal, shell and bone. This layer was up to 40 cms deep and in most places overlay sterile white beach sand, layer 5. At the base of layer 1, a series of depressions were found, most containing ovens with oven stones still in place. As shown on the section (Fig. 51), one of the oven depressions was partly filled with sand mixed with charcoal and occasional pockets of burnt sand. This was called layer 2. In a restricted area along the seaward side of row 5 an earlier cultural deposit occurred, separated from layer 1 by layer 3, a layer of clean white sand with occasional charcoal inclusions. The lower cultural deposit, designated layer 4, consisted of a thin sloping lens of black sandy material with frequent fishbone. Underlying the whole site was sterile beach sand, layer 5.

In square A-5 the midden from the lens was not collected as a separate sample. However, because all A row samples of layer 1 came from partial squares none was used in the midden analysis. If the sloping lens originally extended to the landward, its constituents could not have included any heavy material, for these would appear as a lag layer between layers 3 and 5. The charcoal in layer 3 may therefore have derived from wind erosion of lenses similar to layer 4, and in places layer 1 may have been built up on a lag layer from this earlier activity. Because all the materials used in the analysis belong to the final occupation, the site will be treated as if it were a single layer.

Fifteen post holes were discovered at the base of layer 1, ranging from 4 to 35 cms deep. As shown on the plan most of these formed a line parallel to the beach beyond the ovens.

ARTIFACTS

Artifacts were rare on this site, only a very small quantity of flake material being found (Table 6). In size the obsidian flakes averaged less than one third the size of the flakes in the western midden (measured by weight), the higher proportion of non-Mayor Island obsidian than in the western midden is highly significant (binomial theorem) and the lower proportion of siliceous flakes is similarly highly significant (Chi squared). One worked section of seal bone was found as well as one unworked dog tooth, possibly being held as raw material for a fishhook point. Two examples of *Glycymeris laticostata,* the shell possibly selected for pendants in N30/5, were found. They were not a pair. One with many worm holes showed no perforation, but the second, which had been broken, had a perforation like those on some shells from N30/5. Two sections of *Dentalium nanum* were found which are undoubtedly units from some ornament. In the paucity of the artifacts, this site contrasts vividly with the western midden, N30/5.

Table 6. Artifactual material in N30/4.

	No.	Wgt. (g)
Mayor Island obsidian	6	10.7
Other obsidian	7	4.4
Siliceous flakes	2	69.4
Worked bone	1	—
Dentalium shell sections	2	—

FAUNAL REMAINS

Shellfish

The species encountered are given in Table 7.

Table 7. Shellfish in N30/4, by squares.

SPECIES	SQUARE						
	B1	B2	B3	B4	B5	C1 & Baulk	Total
	Wgt. (g)	Wgt. (g)	Wgt. (g)	Wgt. (g)	Wgt. (g)	Wgt. (g)	%
Lunella smaragda	1257	447	984	2069	1058	1183	56.6
Nerita melanotragus	122	271	191	459	1160	47	18.2
Chione stutchburyi	—	17	35	210	—	4	2.2
Amphidesma australe	94	70	72	96	38	19	3.1
Amphidesma subtriangulatum	64	71	151	105	40	80	4.1
Amphidesma sp.	71	12	23	35	17	5	1.3
Cellana sp.	7	5	11	47	38	3	0.9
Cookia sulcata	353	39	32	47	31	44	4.2
Neothais scalaris and *Haustrum haustorium*	219	48	129	152	114	80	6.0
Haliotis iris	69	29	35	49	32	30	1.8
Zediloma sp. *Melagraphia* sp.	32	—	12	13	36	5	0.8
chiton	—	3	1	1	3	—	0.1
Zethalia zelandica	—	—	3	2	—	—	x
Maoricrypta sp.	—	—	—	1	—	—	x
Pallium convexum	—	2	—	x	1	—	x
Penion adustus	—	—	—	8	—	—	0.1
Cantharidus opalus	—	—	1	—	—	—	x
Protothaca crassicosta	—	9	—	—	7	—	0.1
Mayena australasiae	—	33	—	—	—	—	0.3
Anomia walteri	—	—	—	—	1	—	x
mussel	5	3	—	—	—	—	0.1
Charonia capax	7	x	x	—	—	—	0.1
Cominella glandiformis	x	—	x	—	—	—	x
Total	2300	1059	1680	3264	2576	1500	100.0
Unsorted	48	242	539	212	8	126	

Comparison of the shell content of this midden with that of the western midden (see Table 2 and Fig. 58), shows they have a remarkable similarity, with the same species dominating both middens but with some changes in frequency. Shellfish from environments other than rocky shores show some increase and indicate that some contact with areas some distance away was maintained. The main difference between the sites is the far greater importance of shellfish generally in the diet at this site.

The ratios of *Lunella* to *Nerita* in the two sites alters from 14.5:1, to 3.1:1. If the ratios of the various shells in each site are studied it can be seen that the preference for the larger *Lunella* over *Nerita* is typical of a general preference for larger shells. The large species *Cookia sulcata* and *Haliotis* were both more popular in the western midden. While this might be seen as a cultural preference the increase in imported shellfish in the later site tends not to support this. A more likely explanation is that the occupants of the later site could not choose to be selective in collecting shellfish as the inhabitants of the western midden could.

This needs qualifying as it does not prove that the shellfish in the bay were in any way depleted or reduced in size before the collection started if there were two separate incursions into the bay. Nor should it be taken to prove that the population was at a level where they could not afford to be selective in their choice of shellfish for a long period. To prove any of this would take far more evidence. All that is indicated is a heavier demand for a short period at least, for which there could be a variety of causes.

The variability from square to square in N30/4 is noticeable, both in the amount of shell and in the proportions of different species. The proportion of *Lunella* to *Nerita* is particularly variable, possibly indicating that these two species were collected, or at least eaten and dumped, at different times. As *Nerita* tends to live on the littoral fringe higher than *Lunella* (Morton & Miller 1968, p. 80-81) this variability could arise from collecting at different stages of the tide.

The near disappearance of mussel and the disappearance of rock oysters *(Crassostrea)* is linked with a decline of their predators *Haustrum* and *Neothais* respectively, though both of the latter also prey on other shellfish, particularly *Lunella* and *Melagraphia*. Intensive rock shellfishing as carried out by prehistoric Maoris must have severely disturbed ecological balances such as these.

Birds and mammals

The material recovered is listed in Table 8.

Table 8. Mammals and birds in N30/4.

SPECIES	COMMON NAME	Minimum No.
(?)	Whale	1
Canis familiaris	Polynesian dog	2 (1 immature)
Rattus exulans	Polynesian rat	1
(?) *Arctocephalus forsteri*	Seal (?) Southern Fur	1
(?)	Moa	1
Diomedea sp.	Albatross, Royal or Wanderer	1
Eudyptula minor subsp.	N.I. Little Blue Penguin	1
(?)	Large petrel, immature	1
Pterodroma macroptera gouldi	Grey-faced Petrel	1
Puffinus gavia gavia	Fluttering Shearwater	3 (1 immature)
Puffinus sp.	Petrel, smaller than *P. gavia*	1
Pelecanoides urinatrix	Diving Petrel	1
Phalacrocorax p. punctatus	Spotted Shag	1
Nestor meridionalis septentrionalis	N.I. Kaka	1

The fragments of whale, moa, seal and albatross are almost certainly only industrial waste and need not imply consumption on the site as all were rare and several fragments were worked. The large petrel is possibly black petrel which still nests on Little Barrier. Despite the vastly greater quantity of shell at this site the number of birds has decreased. Against 14 species which were probably consumed at the previous site only 8 were found here and the minimum number of individuals also decreased. Dog however, seemed to retain some importance if seal declined. The decline in the number of shags and land birds is the most remarkable feature. As well as dog bone, faeces thought to be from dogs were recognised. These contained fish bone and scales.

Fish

As in the western midden the bone was very fragmentary and only an identified fragment count is possible. The species encountered are listed on Table 9.

Table 9. Fish in N30/4.

SPECIES	COMMON NAME	No. identified pieces
Chrysophrys auratus	Snapper	83
Navodon scaber	Leather Jacket	92
Coridodax pullus	Butter Fish	9 (all doubtful)
Squalus blainvillii	Dog Fish	26
Thyrsites atun	Barracoutta	2
fam. *Labridae*	(?) Red Pig Fish	4 (all doubtful)
Arripis trutta	Kahawai	8
Trachurus declivis	Horse Mackerel	2
fam. *Carangidae*	—	5 (all doubtful)

As at the previous site, leather jacket was recognised by its single dorsal spine giving 61 as its minimum number of individuals. All the dog fish bone was vertebrae and possibly represents only one individual.

Both the increase in the number of species represented and the decline of the dominance of snapper replaced by leather jacket are noticeable when comparing this site with the western midden. Again the presence of leather jacket and butterfish would argue for some form of trapping or netting but in the absence of any fishing artifacts from the site the method of taking the remainder must remain unknown. The presence of kahawai and barracoutta might be taken as an indication of more successful trolling than was evinced in the western midden.

The proportional decline of snapper could be a seasonal effect, or could be a result of a wider fishing technology employed at the time of this site. No sound case could be made for a decline of the snapper population. Snapper is still dominant on some apparently late sites (Shawcross 1967).

SEASONALITY

Some of the animals appearing in this site are seasonally restricted as at the western midden. Since the seal bone in the site is almost certainly industrial waste no claims can be made from the presence of this animal.

The burrow-nesting birds are again useful. An occupation in the months of November or December is sufficient to explain the evidence, though an occupation which ended in August or October and began again in January, February or March would also be sufficient. This does not rule out continuous occupation however. The higher frequency of immature birds than at the other site might suggest a relatively late period of birding.

The comments on the late summer and autumn increase of snapper made for the other site apply here also. In addition barracoutta provides another restraint, for this fish is rare inshore other than in the summer and autumn.

An attempt was made here also to determine the season in which the *Chione* shells had been collected. Nine shells were sectioned, three of which were found to be infested with a shell borer which appears to cause irregular growth and thickening of the shell. The other six were thinner and uninfested and show a remarkably similar patterning of the black bands. The sequences of bands all terminated at a similar point after a small amount of growth had taken place after the last band. It is apparent from other work that these bands relate to the winter interruption to growth. Consequently the growth termination in these shells suggests spring or early summer as a likely period of collection.

Use of the site through spring and summer seems to be indicated but again no proof can be offered that the site was not used in the autumn or winter.

DISCUSSION

This site would seem to have served as a base for food preparation, the food being gathered predominantly by shellfishing, fishing and birding. Specialised sites such as this midden have conventionally been placed late in the North Island sequence. Stratigraphically this is born out at Tairua (N44/2) and Ponui (N43/1). The dune middens at Horowhenua (Adkin 1948, p. 39) also support this late dating. Negative evidence from the rarity of extinct birds or Archaic artifacts among the rare artifacts from specialised middens furnishes additional support.

Within the limitations of the environment in this bay no drastic changes in exploitation of its food resources could be anticipated. The economic differences between this site and the western midden are not great but they are still distinct. The change in emphasis towards shellfish, and smaller shellfish, at the expense of fish and birds together with a greater use of the variety of fishing methods favour a different and later dating for this midden than the western midden. The differences in the obsidian assemblages support this contention.

The only artifacts of diagnostic value are the two *Dentalium* sections. Certainly they mostly occur in early assemblages but Green suggested their use persisted quite late (Green 1963, p.58). Their presence on a Classic site would, however, be surprising. While there is a risk that the example from A-2 in the site originated from the lower lens, and could be considerably earlier than the layer 1 midden deposit, this cannot be the case for that from square B-1.

Thus no strong conclusions can be reached but on the evidence above some date later than the western midden must be preferred.

The line of post holes suggests a windbreak against the wind from the exposed bay. The wind rose on Fig. 51 shows that while this is not a prevailing direction for wind it is not an uncommon direction either. If such a wind break was present while the midden was being formed however it would be expected that the midden would be more concentrated to one side of it. This is not the case, suggesting rather that the structure was an open wall. A fish drying rack or a cooking or canoe shelter are possibilities. Either of the latter would probably require a second wall either on the eroded seaward side or in the unexcavated area on the landward side.

Clearly this was a specialised site where fish and shellfish were cooked in the shelter of some kind of structure, but its relationship to other contemporary sites is not known.

The evidence of seasonality does not force a conclusion that the site was *not* used at any particular time of the year. Its manner of use could well have been continuous in conjunction with dwelling sites within a few minutes walk, or it could have been irregularly or seasonally used, perhaps on a daily basis, by people resident some distance away. Much of the midden material in the bay front must relate to the pa and pit and terrace sites behind the bay and this particular site is more likely to be related to nearby sites than to an external site.

THE PA SITE, N30/3

On a low ridge above the eastern midden (Fig. 1) is the third site excavated, a small pa (Fig. 52). The site is grass-covered and the only features to be seen, the pit and the trench, are both clearly defined. To the west the ridge continues and a mantle of sand blown up from the beach may conceal more of the site. As shown on the plan, the pit and the defensive trench were investigated, five squares being excavated in all.

STRATIGRAPHY

The stratigraphy of the pit (Figs. 53, 54) proved complex. Layers, from the surface were:

Layer 1: Turf and topsoil.

Layer 2: Black matrix with shell and bone inclusions.

Layer 2a: As 2 but no midden.

Layer 3: Mixed material of black, grey and yellow colouration and inclusions of charcoal.

Layer 3a: A lens of bright yellow clay within layer 3.

Layer 4: Yellow clay.

Layer 4a: Yellow-brown sand overlying layer 4 at one point.

Layer 4b: Lens of grey material within layer 4.

Layer 4c: Lens of black burnt material and charcoal within layer 4 and belows lens 4b.

Layer 5: A sand layer on the floor of the pit with inclusions of burnt fern-tree trunks.

Layer 6: Natural.

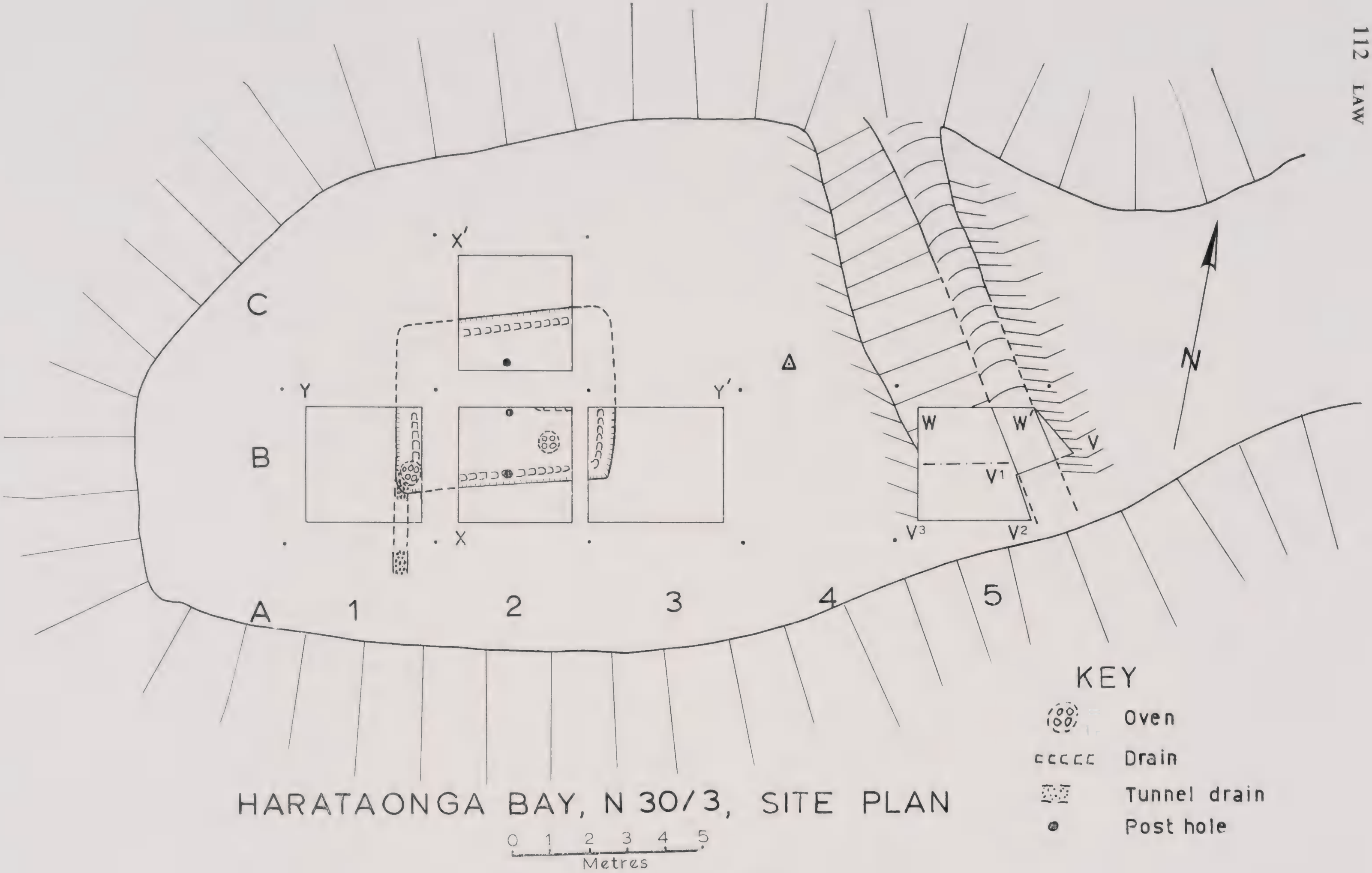
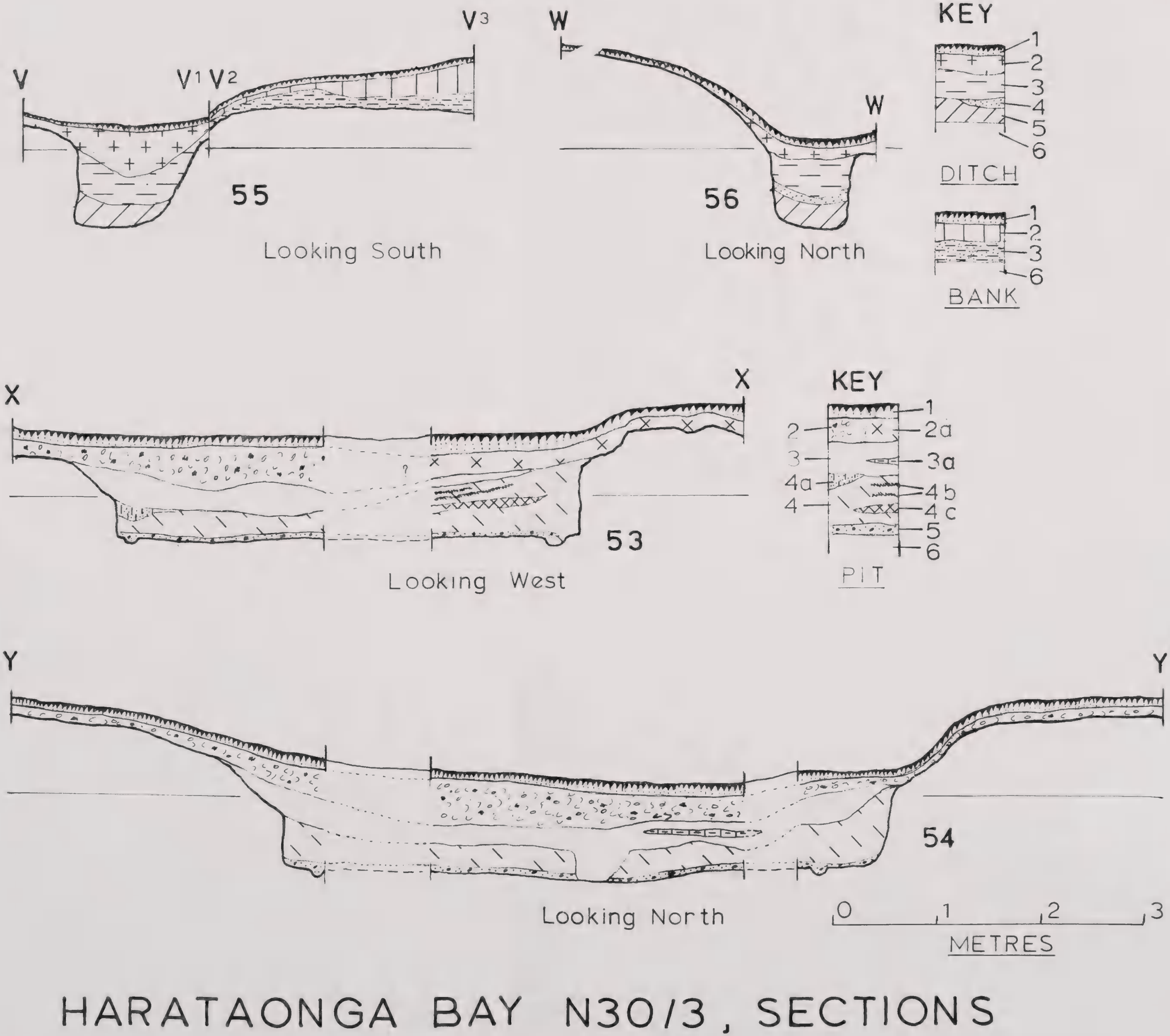


Fig. 52. Site plan N30/3, the pa site.



Figs. 53-56. Sections for site N30/3. For locations see Fig. 52.

Two ovens were found dug from the surface of layer 4.

The sections through the ditch were simpler (Figs. 55, 56). From the surface the stratigraphy in the ditch was:

Layer 1: Turf and topsoil.

Layer 2: Dark brown soil with flecks of yellow clay.

Layer 3: Yellow-brown soil with large inclusions of yellow clay.

Layer 4: Dark brown with fine flecks of yellow clay.

Layer 5: Dark brown soil but with more abundant yellow clay.

Layer 6: Natural.

In the low bank the following layers were encountered:

Layer 1: Topsoil and turf.

Layer 2: Yellow clay consisting of hard lumps in a soft matrix.

Layer 3: Dark brown soil with flecks of yellow clay.

Layer 6: Natural as elsewhere.

STRUCTURES

The pit on excavation proved to be rectangular with a wall drain and possibly a central drain though this was only partly excavated. The wall drain led to a sump which was drained through a tunnel to the outside slope. Three post holes were found, 16 to 21 cm deep. They were in line along the short axis of the pit. Conventionally rows of posts in pits are along the long axis suggesting that a double row of central posts and occasional wall posts may be the pattern in this pit. The missing posts may be under the baulks. Alternatively, in a pit close to square in plan, a ridge along the short axis is a reasonable method of roofing. No other structures were recognised in the limited flat areas excavated beyond the pit.

The defensive trench was steep sided and flat bottomed. No evidence of palisade posts was found in the limited excavation through the trench and bank.

ARTIFACTS

With the exception of obsidian flakes, artifacts were rare on this site. One worked piece of dog mandible was found as well as six worked fragments of albatross limb bone. A spall from a basalt boulder, a piece of fossilised wood, a piece of kauri gum, six pieces of red and orange ochre and 18 flakes of a variety of siliceous material completed the assemblage. Unlike the western midden, obsidian flakes were more common than siliceous flakes. As well as the process of replacement of Mayor Island obsidian by local obsidian sources, local obsidian appears to have replaced other siliceous materials.

The obsidian included Mayor Island and grey obsidian, the latter most probably from the local sources. All the obsidian except three pieces was from layer 1 of the pit and the immediate area of the pit. The majority of the obsidian flakes were from square C 3, but some flakes came from all squares. The proportion of green Mayor Island obsidian from square C 3 on a flake count was 30 % as against 14 % from the aggregate of the other squares. The comparable figures for weights are 23 % and 6 %. For the total obsidian assemblage the figures are 21 % Mayor Island by flake count and 15 % by weight. The variation from square to square is statistically significant at a 5 % level (Chi squared on flake numbers). In view of the proven variation of the percentages from square to square, the figures for the site as a whole must be regarded as of limited accuracy, as the area excavated may not be representative.

Figure 57 shows flake weight distribution curves for the flake material from this site. The range in sizes is again large as it was at the western midden but some important differences do emerge. Whereas at the western midden the various materials all had very similar curves, here the obsidians are clearly separated from siliceous flakes by their smaller size, which is also smaller than at the western midden. This would suggest that smaller flakes of obsidian were being deliberately used here, possibly to economise

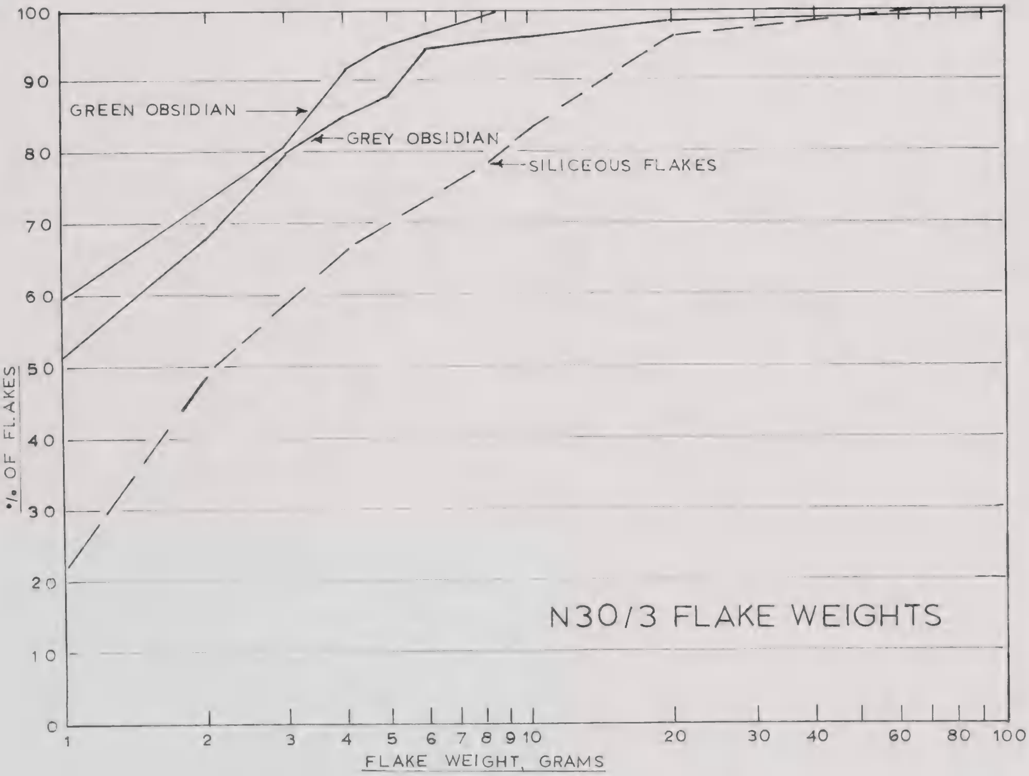


Fig. 57. Flake weight distribution curves for N30/3.

on raw material or because a greater control had been gained over this material. In view of the proximity of the source, the latter seems more likely.

All the flakes were simple conchoidal flakes, without retouch, and some of the obsidian flakes showed use flaking on the edges. It was noticeable that more of the grey obsidian showed the weathered exterior of the primary raw material. The range of siliceous materials appears similar to the western site, but relative to obsidian, much less frequent. Taken on flake count the change in proportion of the sources of obsidian is compared to N 30/5 highly significant (Chi squared) and compared to N 30/4 significant (binomial theorem). The lower frequency of siliceous flakes here was also highly significant when compared to N 30/5 (Chi squared) but there was no significant difference from N 30/4.

The material recovered is recorded in Table 10.

Table 10. Artifactual material in N30/3.

	No.	Wgt. (g)
Mayor Island obsidian	37	52.3
Other obsidian	131	305.1
Unidentified	3	6.1
Flakes, various siliceous materials	18	150.4
Kauri gum	1	2.0
Ochre	6	18.6
Fossilised wood	1	4.4

FAUNAL REMAINS

Shellfish

Shell material in this site was severely weathered, owing no doubt to more acid soil conditions than in the sand at the other two sites. Many of the shells disintegrated on disturbance but a collection of individual shells made during the excavation included the following species: *Amphidesma australe, Amphidesma subtriangulatum*, *Chione stutchburyi, Haustrum haustorium, Cookia sulcata, Lunella smaragda, Neothais scalaris*, chiton and *Protothaca crassicosta*. The majority of the shell came from layer 2 of the pit fill.

The presence of *Aphidesma* and *Chione* indicates the continued use of shellfish from beyond the immediate area of the site. The other species are all of local occurrence and well represented in the other middens excavated.

Birds and mammals

A mere 25 fragments of bone were recovered from this site and the majority of these cannot safely be concluded to be anything other than industrial waste. Dog was represented by pieces of the mandible alone, the most useful portion for hook manufacture, and seal by one fragment of bone and three of teeth. Albatross bone was present and all was worked. One cat cranium was taken from the top of layer 2 of the ditch fill. Wild cats occur on the island and this is probably an example.

The species are as follows. Mammals: *Canis familiaris,* (Polynesian dog), *Felis catus,* (Cat), *Arctocephalus forsteri,* (Fur seal), Whale (species not determined). Birds: *Nestor meridionalis septentrionalis,* (N.I. Kaka), *Diomedea* sp. (Albatross).

Fish

Fishbone was rare on this site. In nine identifications the following species were identified; snapper, leather jacket, possible butterfish, possible carangid, and kahawai. As with all the faunal material from this site numbers are insufficient to make any meaningful comparisons with the other sites. Given the fish at the other two sites, none of these identifications is in any way surprising.

SITE HISTORY

A fairly complex history is indicated for the pit and its fill. During the life of the pit, a layer of sand, layer 5, had arrived on the floor. While this sand could have blown in from the beach below (sand is still being blown over the site), it could have been a layer deliberately placed in the pit. The profile adopted by the sand is consistent with the latter. A similar layer has been found in pits at Sarahs Gully, and a sand layer is still used in some modern kumara pits. Burnt pieces of punga (tree-fern) trunks have become mixed with the sand. Punga trunks have been recorded as a pit lining by ethnographers. Layer 4 overlying the sand is of very loose consistency and of fairly even depth over the floor, suggesting it did not arrive in the pit by any natural process. The two oven depressions were dug in the surface of this layer and this probably resulted in the other disturbances to layer 4, and the ash and charcoal lenses in the top, namely layers 4 b and 4 c. Layer 3 could not have been similarly placed and must represent some period of time in which natural infilling was taking place with the walls of the pit being broken down.

Layer 2, a diffuse midden layer and layer 2 a represent a cultural accumulation, possibly placed in the pit to level the site. Outside the pit, layer 2 a may be a natural soil horizon. Layer 1, the topsoil, has formed from layers 2 and 2 a since the site's abandonment. The stages in the pit, then, are first the construction and use of the pit, followed by its infilling, possibly deliberately, and the use of the infilled area first for cooking and then later as an area where food, waste, industrial waste and flake material were deposited.

The sequence in the ditch cannot be absolutely correlated with the pit fill. Layer 5 is probably immediate "roll in" infill and layer 4 possibly a paleosol, but alternatively layer 4 could be a local area of puddling as it does not occur in the other section. The surface of layer 3 in the section 1 - 2 suggests that it too is a natural fill layer. Layer 2 is probably both a natural soil layer outside the ditch and a layer of slower natural infilling and weathering in place within the ditch.

The section 3 - 4 through the low bank is difficult to interpret. Probably layer 3 is a paleosol and layer 2 consists of material deposited from the excavation of the ditch. Layer 3 here is similar to layer 2 in the ditch. The ditch could be correlated either with the pit construction or with the later midden deposit or it may have continued in use through both the pit's use and the site's later use. The absence of occupation material under the bank might argue for an earlier construction.

The possibility that the pit was undefended when it was built is not unlikely as this type of situation is a favoured one for undefended pit sites on this northern coast.

DISCUSSION

Regardless of whether the pit was part of the defended site or not, the site as a pa can only be regarded as an unusual example on account of its small size, and its weak defence. Other pa as small as this, with room only for 3 or 4 pits or houses, do occur. Two notable examples were figured by artists on Cook's voyages. These however together with six of a similar size or smaller, known to the author from Northland, all have the distinguishing characteristics of exceedingly strong defence formed by cliffs on all or almost all sides. It would appear that generally when a small group chose to be self-sufficient in defence they relied a good deal on nature as an aid to fortification. A weak fortification such as this site would seem to leave its few inhabitants at a large tactical disadvantage against any enemy numbering in tens of warriors.

It is as difficult to conceive circumstances when weak fortifications would be required to combat some social friction less than total war, as it is impossible to believe fortifications ever evolved through some type like this.

The various activities revealed by the excavation suggest that this was a fairly generalised site, used for food storage, defence, cooking and some working of stone and bone. Even so, the range of activities is smaller than at the western midden. All these activities were not contemporary, since the storage predates the cooking and material working in the excavated area. The small amount of midden material could represent at most only a few meals for a few people, far less than the potential kumara storage capacity of the pit. This has a below ground volume of 22.5 cubic metres, which at 130 ± 55 % person days per cubic metre (Law MS) provides 1300 - 4600 person days of food. This calculation allows for unused pit volume, losses in storage, seed tubers, variability of the calorific requirement of a population and of the calorific value of kumara. Beside these figures the later midden on the site is insignificant. This site seems to demonstrate a sequence from a specialised storage site, possibly defended, to a cooking and material working site, also possibly defended. In its later stage this site may have resembled site N38/30 on Motutapu Island (Leahy 1970) which was a pit and terrace dwelling site with evidence for many activities. Few of these sites have been investigated but it appears they were more generalised than the more frequently investigated late middens, pa and pit sites.

Even so, this site in whole or part is more specialised than the western midden and a later date must be preferred.

With agriculture definitely present, users of this site must have been in residence at least occasionally for a large part of the year to grow and consume the crop. No other clear seasonal indicators have been recognised.

SUMMARY AND DISCUSSION

Ideally, it is desirable to order these sites through time by some culture-free chronometer such as obsidian rims. This leaves any culture change which occurs as an unquestionable conclusion. Unfortunately, only one site, the western midden, is at all closely dated by such means. The other two sites have been assigned to a later date on the cultural grounds that they are more specialised, and by an obsidian source utilisation chronology (at least by Green 1964). This was done on the basis of previous experience of other sites. Any conclusions which may then be drawn about cultural change through time to specialised sites are strictly speaking, circular arguments. If, however, the hypothesis of greater specialisation leads to a sequence of other cultural variables, which supports and endorses greater specialisation, then greater specialisation attains greater standing as a proven fact rather than as a hypothesis. Green's use of specialisation among other criteria (Green 1963) to order sites produced many convincing relationships. In the Harataonga case the data are much poorer than were available to Green and external evidence must be adduced to support the hypothesis of greater specialisation. Certain conclusions are possible however.

Figure 58 shows diagramatically the differences in some of the faunal remains between the sites. It is worth emphasising that as the sites are so close together they all existed in a single environment and differences between the sites can be expected to be significant. The bottom diagram illustrates the differing characters of the sites, the western midden N30/4, remarkable for its artifacts, the eastern N30/5, for its shellfish, and the pa N30/3, for its relative lack of both artifacts and faunal remains. These represent well the extremes in North Island archaeology.

In the first place there is a decided change of protein diet from emphasis on fish, birds, dogs and seal to a diet which in its surviving remains, at least, seems to concentrate far more on shellfish. The evidence from the shellfish seems to suggest the earlier inhabitants could afford to be selective, as they ate more of the larger species. The decline in seal and dog can probably be attributed to a limitation in the populations of these animals. Fish remains showed a change from snapper domination to larger numbers of other fish, noticeably leather jackets.

The roles of the important vegetable foods, fernroot and kumara, are hard to assess. The dental wear on the burial excavated may suggest some heavy use of fernroot (Taylor 1963) but its dating is uncertain. The pit on the pa is almost certainly evidence of kumara agriculture, the only such evidence recovered. It is possible that crops were grown by the inhabitants of the western midden but certainly not proved. Overall the evidence is consistent with a larger population in later times which exceeded the capacity of the environment to provide the most palatable and easily obtained protein foods and necessitated the consumption of foods which required more work to procure.

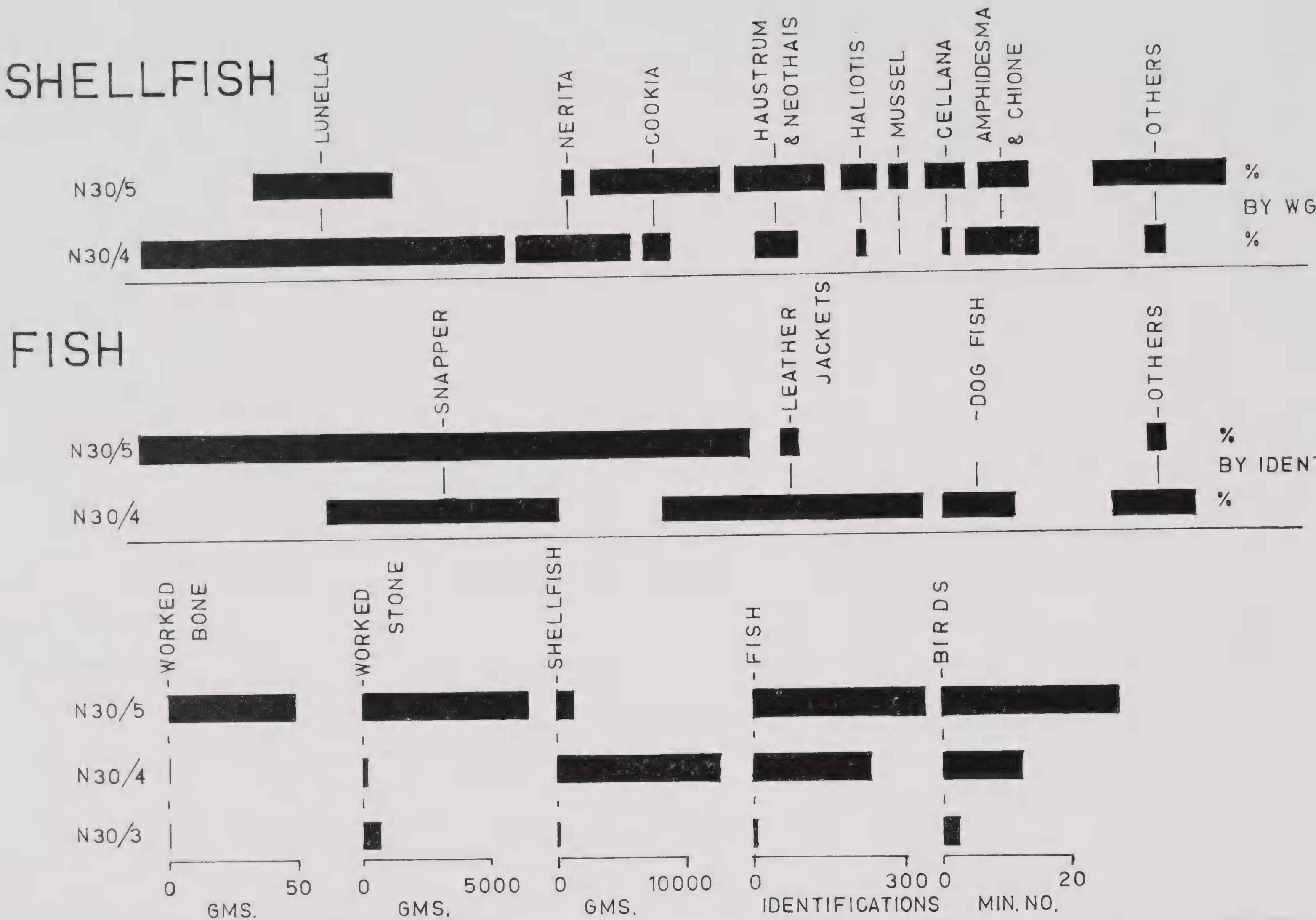


Fig. 58. Inter-site comparisons for shellfish and fish by double lenticular percentage graphs, and for total excavated materials by histograms.

Earlier in this paper it was suggested that the wide range of food used by the inhabitants of the early site argued that it was occupied some time after the initial settlement. Green had previously suggested that a site of his Settlement Phase would exhibit the widest range of native resources (Green 1963, p. 32). A point not stressed by Green is the vast difference between a tropical island environment where the economy was oriented towards agriculture, and the cooler New Zealand environment with marked and economically significant seasons, and the largely exploitational economy of the early cultural phases in New Zealand.

Techniques of tool manufacture and use had to be relearnt for the new raw materials, new bird and fish habitats and methods of procurement would have to be mastered, the palatability tested and a taste acquired for the more exotic foodstuffs. A site truly belonging to a settlement phase must show evidence of this primary adaptation. Such a site could well reveal an economy with many surprising gaps. While this is not generally the case at the western midden, a gap like the absence of trolled fish when compared with the eastern midden, could suggest an area in which new techniques had not yet been developed.

In considering the range of food resources used, therefore, some consideration should be given to early limitations to technique as well as late limitations to supply.

Only a few conclusions can be drawn by comparing the artifactual assemblages. Some changes are apparent in the flake assemblages in the two sites where these were substantial. The importance of siliceous materials compared with obsidian declined markedly in the later sites. Some connection between the siliceous flakes and the drill points at the western midden would make this more explicable. The significant variation in proportion of obsidian from different sources within one layer at the pa site serves as a warning against interpreting significant differences between sites as always reflecting separation in time. The spatial distribution of the flakes on the pa could have arisen from the localised working of a single core of obsidian. In this case, this would be the cause of the statistical significance. With such groups of flakes on sites, valid samples become far larger and have to cover wider areas, to incorporate an adequate number of groups of flakes resulting from the use of one core, if indeed there is on the site an adequate number of such groups. To obtain such samples or to satisfactorily prove that the process of manufacture and loss or waste of flakes was identical for the two or more obsidians will not very often be possible, and must limit the utility of chronological ordering by proportions of obsidian flakes. The flaking of obsidian seems to have become more careful by the time the pa was occupied as it has a higher proportion of small flakes than the early site. Few other differences were apparent on inspection but they may be present, to be revealed by analyses such as that performed by Leach (1969) on assemblages from Murihiku. Certainly no blades or regularly worked cores such as were used in the early South Island appear in the early site. The worked bone on the pa supports a change in the common raw material from moa bone to dog. Although no fishhooks were recognised at the later sites the bone waste was probably from the manufacture of well-known points of two-piece hooks.

The evidence from this bay does nothing to overthrow the often held views on the early unimportance or absence of agriculture and warfare but only in the latter case can these sites lend strong support.

Three phases could comfortably encompass the evidence here, a settlement phase (no evidence, but inferred for the area if not this bay), an Archaic Phase (the western midden), and a later phase, not defined to Classic by artifacts, but Classic by default (the other two sites). At the present stage while there is much of interest in the material from this bay there is little that is revolutionary. Most of it is consistent in dating and character with the statements of New Zealand prehistory made in the past fifteen years, or can be accommodated with minor revisions to the latter. There are only hints of continuity of change in the tool kit, settlement pattern and economy but it would be too ambitious to expect such a full sequence from these sites.

Much of the discussion of New Zealand prehistory lacks an empirical background of published archaeological facts. It is clear from these three very minor sites that even here analysis can produce useful information. Given the data from the major excavations of the last 15 years, New Zealand prehistory could cease to be, as Groube put it, "a just so story".

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